THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LX. No. 1532.] LONDON, SEPTEMBER 20, 1892. [44TH YEAR. PRICE 6d.

GAS AND WATER PIPES

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Lanemark Coal Co.,

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AND GAS COALS.

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SOLE MANUFACTURERS OF WECK'S PATENT CENTRE-VALVE;

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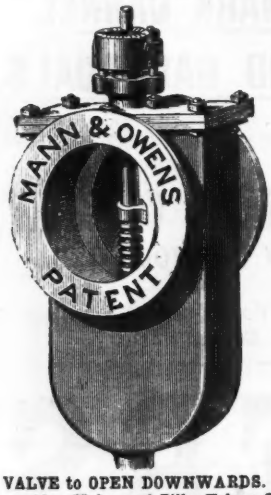
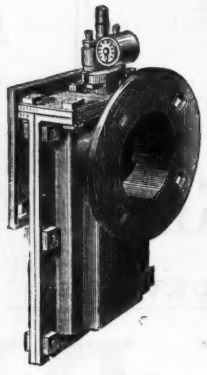


VALVE to OPEN DOWNWARDS.



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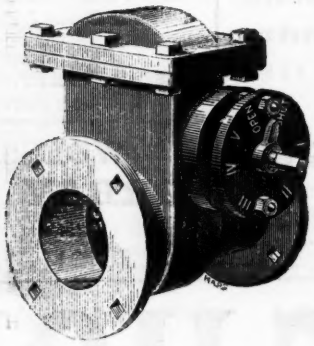
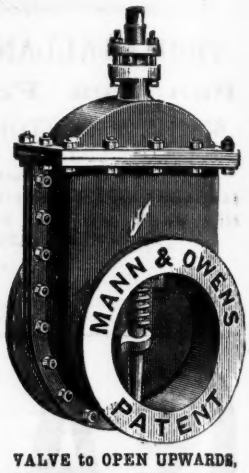
for Regulating the Seal
of Hydraulic Mains.



FULL-WAY RACK AND
PINION VALVE.



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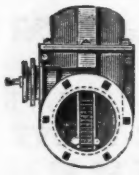

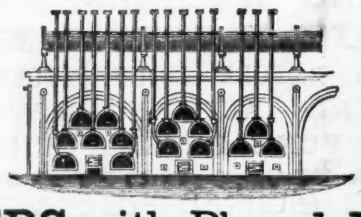

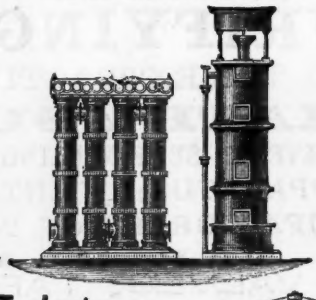

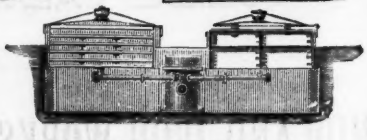

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DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

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GAS APPARATUS OF EVERY DESCRIPTION.

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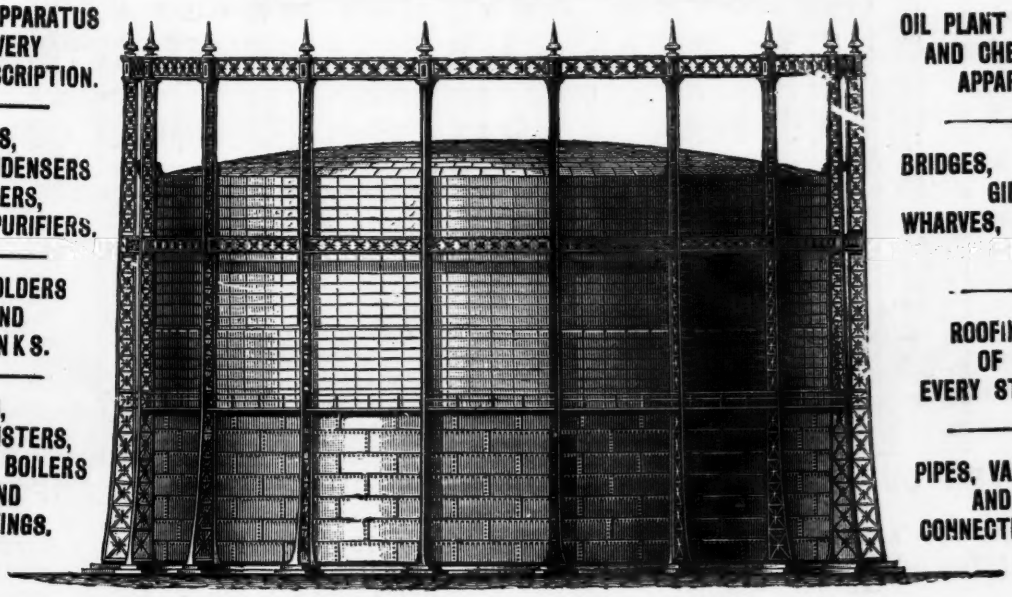

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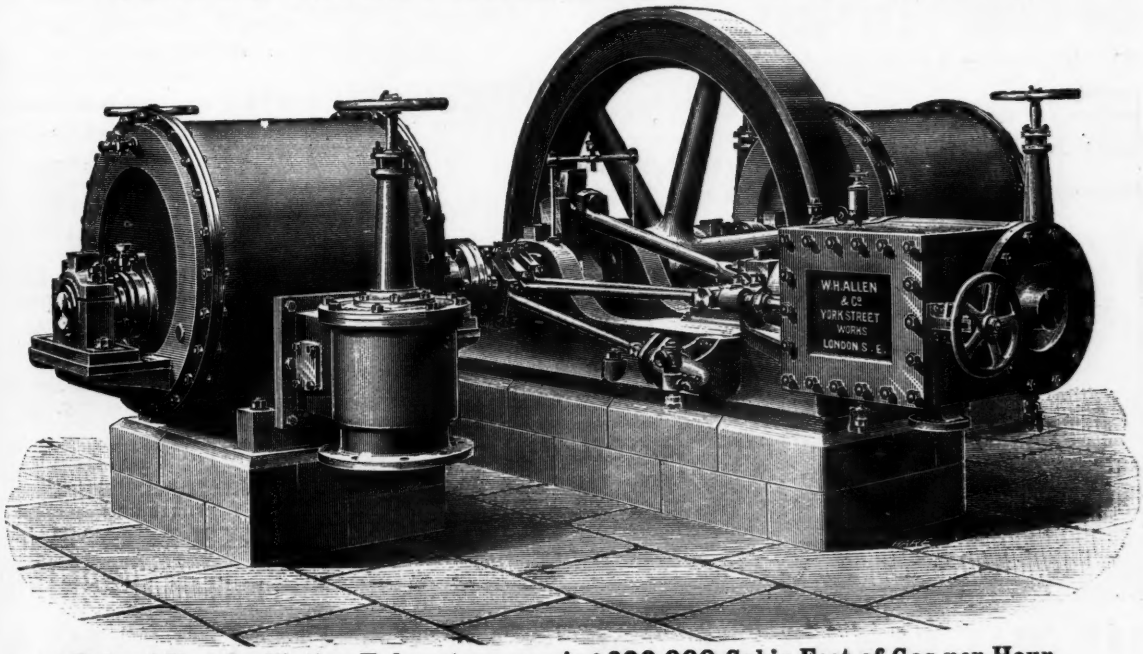

Pair of Non-Oscillating Exhausters, passing 200,000 Cubic Feet of Gas per Hour.

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LONDON OFFICE: 6T. THOMAS APOSTLE, E.C.

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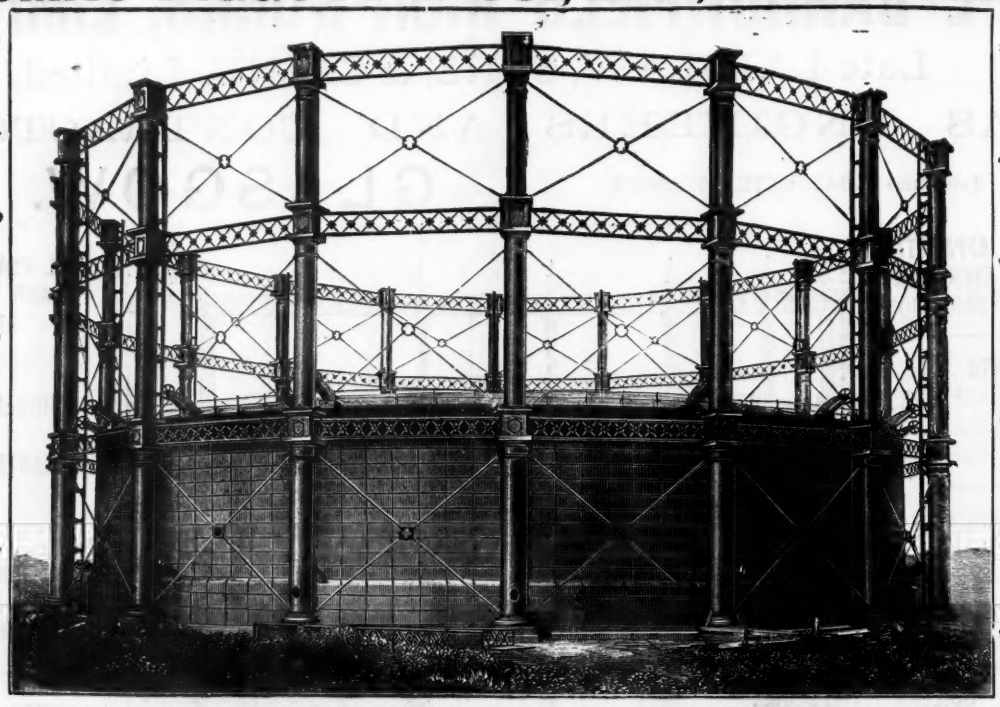

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WELDED & RIVETED FOUL PIPES, MAINS, RETORT-LIDS, & CAST TANKS, PURIFIERS, WROT

OVER 500 GASHOLDERS HAVE BEEN SUPPLIED AND ERECTED,

INCLUDING THOSE SUPPLIED TO THE FOLLOWING GAS COMPANIES AND CORPORATIONS:

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BIRMINGHAM.	BRIGHTON.	COVENTRY.	LEICESTER.	OLDHAM.	SOUTH METRON.	VIENNA.

WEST'S GAS IMPROVEMENT Co., Ltd.,

(Mr. JOHN WEST, M.Inst.C.E., *Managing Director*),

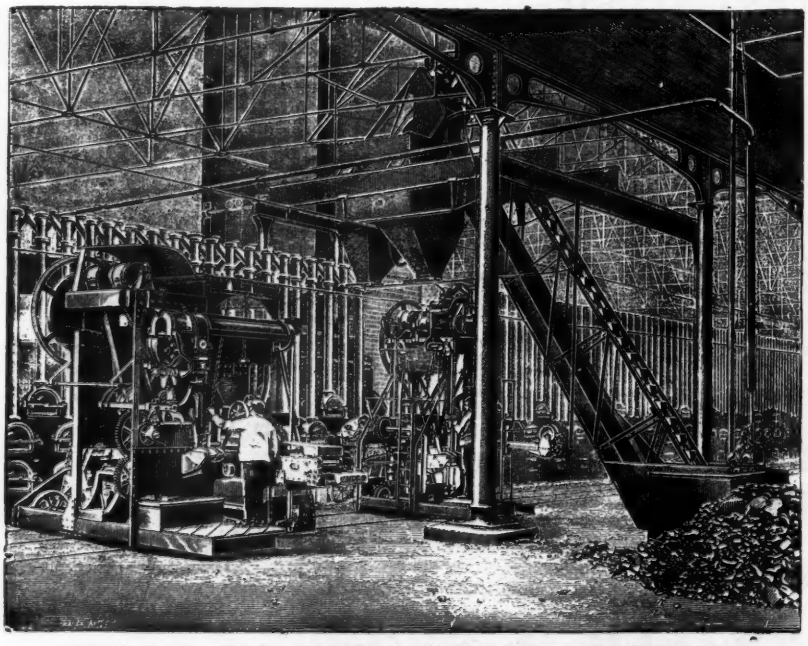
Engineers, Ironfounders, and Contractors,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER,

Manufacturers of

WEST'S PATENTED MACHINERY FOR CHARGING AND DRAWING GAS-RETORTS.

OVER **240** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.



INTERIOR OF RETORT-HOUSE, SHOWING WEST'S PATENTED POWER CHARGING AND DRAWING MACHINERY

MANUAL CHARGING AND DRAWING MACHINES.

POWER CHARGING AND DRAWING MACHINES.

COAL BREAKING, ELEVATING, AND CONVEYING MACHINERY.

COKE BREAKING, CONVEYING, AND WASHING MACHINERY.

OXIDE ELEVATING MACHINERY.

COKE BARROWS, VALVES, AND ALL GAS-WORKS PLANT.

RETORT MOUTHPIECES WITH SELF-SEALING LIDS, FITTED WITH

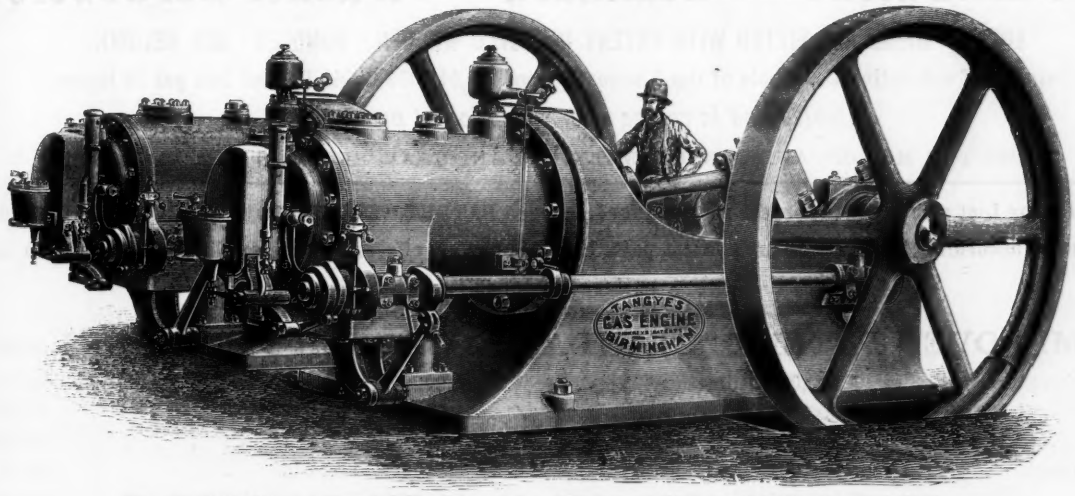
KING'S PATENT FASTENINGS.

N.B.—The whole of these Fittings are made of Wrought Iron.

TANGYES' GAS-ENGINE

"OTTO" PRINCIPLE. PINKNEY'S PATENTS.

Messrs. Tangye have laid down special Plant and Tools for the manufacture of these Engines, and are able by their system of MULTIPLE MANUFACTURE and of WORKING TO GAUGE to turn them out in the best possible style.



The 70-H.P. (Nom.) Coupled Engine, giving 172 Actual H.P., and indicating 200 H.P.
Single Engines from ¼ to 146 Actual H.P. (=170 Ind. H.P.) and Coupled Engines from 86 to 292 Actual H.P. (=340 Ind. H.P.)

APPLY FOR ILLUSTRATED AND DESCRIPTIVE CATALOGUE OF GAS-ENGINES TO

TANGYES LIMITED, BIRMINGHAM.

ALSO AT

LONDON, NEWCASTLE, MANCHESTER, GLASGOW, SYDNEY, MELBOURNE, JOHANNESBURG, GENOA, BILBAO, and ROTTERDAM.

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MORRIS & CUTLER'S PATENT CONDENSER

IN USE AT OVER 70 WORKS.

NOW UNDER CONSTRUCTION FOR

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BRAZIL,
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MANCHESTER.

CUTLER'S PATENT WATER-VALVES,

ESPECIALLY SUITABLE FOR PURIFIERS.

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STRONG, SAFE, CHEAP.

EVERY REQUIREMENT FOR GAS-WORKS SUPPLIED.

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S. CUTLER & SONS,

PROVIDENCE WORKS, MILLWALL, LONDON.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

[SIDNEY HERSEY, Managing Director.] [J. CHANDLER, Engineer.]

452 Patent "Standard" Washer-Scrubbers

(107 OF WHICH ARE FITTED WITH PATENT IMPROVED WOODEN "BUNDLES" SEE BELOW),

Capable of extracting the whole of the Ammonia from 428,645,000 Cubic Feet of Gas per 24 hours,

Erected and in course of construction at present date.

WEIGHT IN MOTION, AND CONSEQUENT WEAR AND TEAR, REDUCED TO A MINIMUM.

The following List comprises the orders received for Improved PATENT "STANDARD" WASHER-SCRUBBERS constructed according to the Company's latest patent, and Renewals effected by the application of same to old pattern Machines.

67 IMPROVED PATENT "STANDARD" WASHER-SCRUBBERS, viz:-

Birmingham	5,000,000	Kilmarnock	1,000,000	Lyons-Vaise (France)	525,000
Beckton	3,500,000	Dover	1,000,000	Barry and Cadoxton	500,000
,,	3,500,000	Colchester	1,000,000	Workington	500,000
Kensal Green	3,000,000	Cambridge	1,000,000	Lowestoft	500,000
,,	3,000,000	West Bromwich	1,000,000	Newton-le-Willows	500,000
Liverpool	3,000,000	Luton	1,000,000	Manchester	400,000
,,	3,000,000	Alger (Algieria)	875,000	Erfurt (Germany)	400,000
Croydon	3,000,000	Valencia (Spain)	875,000	St. Chamond (France)	350,000
West Ham	3,000,000	Barcelona (Spain)	875,000	Santander (Spain)	350,000
Rochdale	3,000,000	,, ,,	875,000	Atlas Steel Works, Sheffield	250,000
Paris	3,000,000	Nice (France)	875,000	Bangor	250,000
,,	3,000,000	Stockport	800,000	Lille (France)	250,000
Glasgow	2,500,000	Magdeburg (Germany)	750,000	Melun ,,	210,000
,,	2,500,000	Altoona (U.S.A.)	750,000	Arles ,,	210,000
Manchester	2,500,000	Smethwick	750,000	Valencia (Spain)	200,000
Leicester	2,250,000	Schneider-Creusot Works		,, ,,	200,000
Swansea	2,000,000	(France)	735,000	Vercelli (Italy)	200,000
Bordeaux	2,000,000	Valparaiso (Chili)	600,000	Rawmarsh	200,000
Melbourne	1,500,000	Halle (Germany)	600,000	Baccarat (France)	175,000
Charlottenburg (Germany)	1,500,000	Elberfeld ,,	600,000	Hitchin	150,000
Derby	1,500,000	,, ,,	600,000	Sydney	100,000
,,	1,000,000	Nancy (France)	525,000	Balson-Chateauroux (France)	70,000
,, (Midland Rly. Works)	1,000,000	,, ,,	525,000		

RENEWALS TO 40 PATENT "STANDARD" WASHER-SCRUBBERS, viz:—

Birmingham	5,000,000	West Ham	1,500,000	Hampton Wick	500,000
Nine Elms (in part)	3,000,000	Nottingham	1,500,000	Kingston-on-Hull	400,000
Vauxhall ,,	3,000,000	Melbourne	1,500,000	Weston-super-Mare (in part)	400,000
Dublin	3,000,000	,,	1,500,000	Deventer, Holland ,, ,,	350,000
Shoreditch (in part)	2,500,000	Crewe (L. & N.W.R. Co.)	1,250,000	Enfield	300,000
Beckton	2,500,000	Beckton	1,250,000	Harrow	250,000
Manchester	2,500,000	,,	1,250,000	Buxton	250,000
Bromley	2,000,000	,, (in part)	1,250,000	Quebec, Canada (in part)	250,000
Pimlico (in part)	2,000,000	Bradford	1,250,000	Reigate	200,000
Plymouth	2,000,000	Maidstone	1,000,000	Newmarket	150,000
Cheltenham	2,000,000	Smethwick	750,000	Leominster	150,000
Croydon	1,500,000	Heywood	600,000	Kidsgrove	100,000
Edinburgh	1,500,000	Heckmondwike	500,000	Driffield	100,000
Hastings	1,500,000				

All New Patent "Standard" Washer-Scrubbers are fitted with the Company's Patent Improved Wooden "Bundles" or Washing Devices, which can be readily fitted to old pattern Machines.

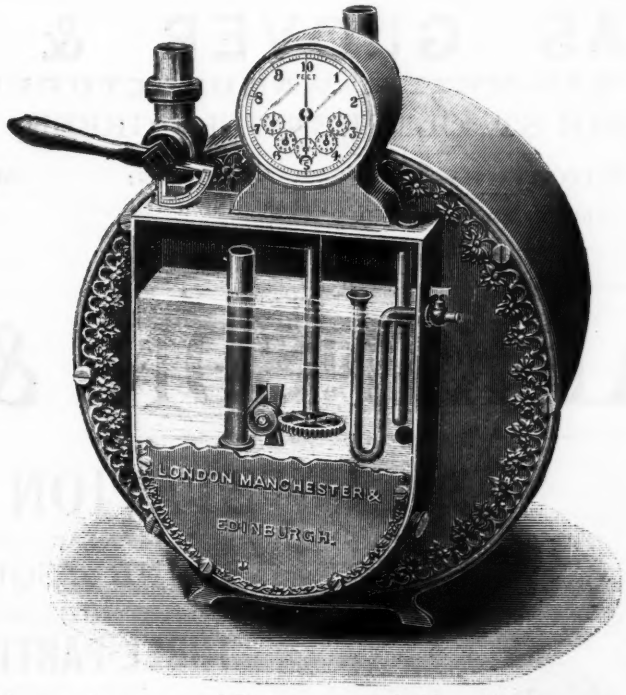
Address: 3 & 4, Palace Chambers, Bridge St., Westminster, London, S.W.

AIR PURIFICATION.

It is now generally agreed that the use of Oxygen, either with or without the diluent Nitrogen, is indispensable for the complete and economical Purification of Coal Gas with either Oxide of Iron or Lime.

Of the various methods proposed for doing this—namely, by drawing in a known percentage of Air with the Foul Gas, or by using a separate and independent oxygen-producing plant (in both of which cases the Spent Lime is rendered innocuous), or by revivifying the sulphided material by exposure to the atmosphere, and then replacing in the Purifiers—the first-named is undoubtedly the most simple and convenient.

All that is necessary is to connect a suitable Air-Meter to the Foul Main on the Retort side of the Exhauster, through which the Air is drawn and measured; and thus the required percentage can be regulated with great exactitude.



The Illustration shows a Meter specially designed for the purpose. The Case is Cast Iron; the Drum and Spout being of Tinned Copper.

A Cock, with Pointer and Quadrant, is provided so that the necessary adjustment can be readily made. This is easily done (the make of Gas being known, and the desired percentage of Air being determined upon) by a minute's observation of the large Index Dial.

Prices and further particulars on application to

W. & B. COWAN,

ESTABLISHED 1827

SMITH SQUARE WORKS, WESTMINSTER, LONDON, S.W. TELEPHONE No. 3230. "DISC LONDON."

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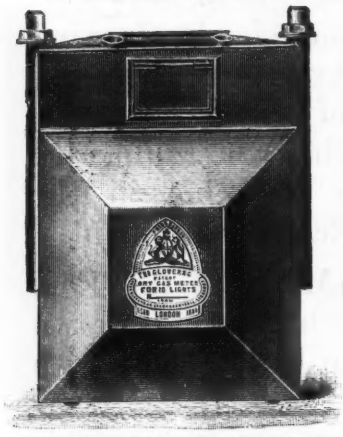
TELEGRAPHIC ADDRESSES:

[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.



1st.—Are a remedy for all the defects of Wet Meters.
2nd.—Are suitable for all Climates, whether hot or cold.
3rd.—Incur no loss of Gas by Evaporation.
4th.—Cannot become fixed by Frost, however severe.
5th.—Are the most accurate and unvarying measurers of Gas.
6th.—Prevent jumping or unexpected extinction of the Lights.
7th.—May be fixed either above or below the level of the Lights.
8th.—Cannot be tampered with without visibly damaging the outer case.
9th.—Will last much longer than Wet Meters.
10th.—Will not cost more than one-half for repair that Wet or Water Meters do.

Are upheld for five years without charge.

Telegraphic Address: "GOTHIC LONDON."
Telephone No. 6725.

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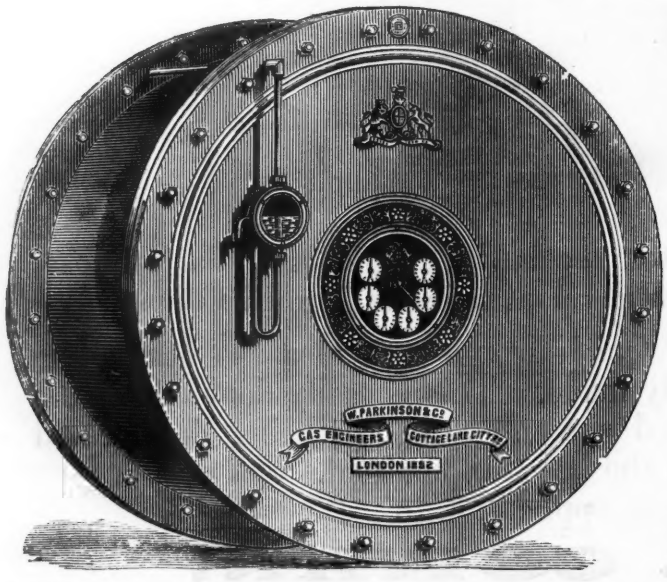
LEEDS: BOAR LANE CHAMBERS, 4, BASINGHALL STREET. *Telegraphic Address: "GOTHIC."*

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."*

W. PARKINSON & CO.



STATION METERS

IN

ROUND or SQUARE TANKS,

FITTED WITH PATENT

THREE-PARTITION DRUMS.

MORE THAN

300 STATION METERS,

Varying in size from **1200** to **200,000** cubic feet per hour, have been sold, fitted with

THREE-PARTITION DRUMS,

Since their introduction.

ROUND METERS as above are kept in Stock in all Sizes ready to send away at the shortest notice. Compact, portable, and very easily fixed. An Improved Overflow Water-line Regulator fitted to every Meter.

DURABILITY UNEQUALLED. SOME HAVE BEEN IN CONSTANT USE FOR OVER 60 YEARS.

COTTAGE LANE WORKS, CITY ROAD, **LONDON.** Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS, **BIRMINGHAM.** Telegraphic Address: "GAS-METERS."

OFFICE: 10, MAWSON'S CHAMBERS, DEANSGATE, **MANCHESTER.** Telegraphic Address: "PRECISION."

[See also Advt., p. 532.

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TO CORRESPONDENTS.

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THE
JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 20, 1892.

The Trouble of Belfast.

THE usual styles of reference to the method of designing gas-works which are to be found in books and memoirs upon gas-works construction, deal with the comparatively simple problem of building a new manufacturing station of given capacity. In reality, the problems that confront the gas engineer are apt to be very much more complex—involving an infinity of dovetailing of considerations, mostly of local origin and bearing, but so important that, should any one of them be misunderstood, the result of the whole operation is affected. As an example of what we mean, may be cited the question of the Belfast Gas-Works extensions, which is now agitating the local authority and the public. Belfast has grown out of its gas-works, and has shut its eyes to the fact far too long. The gas consumption of Belfast very nearly doubles itself every ten years; but it has been impossible to persuade the responsible authorities that the works require corresponding extension. So long ago as 1880 Mr. Stelfox, the Corporation Gas Engineer, reported in favour of making provision for the increased business which he foresaw would come; but the town seemed to have fallen into the hands of a small-minded, timorous set of administrators, who got so frightened at the imaginary prospect that gas was about to be superseded by electric lighting, that nothing was done. Consequently, the works have been patched here and stretched there, to make them last the turn; until at length Mr. Stelfox has come to the end of his tether, and has been constrained to remind the Corporation of their responsibility for keeping the town alight. Everything has been outgrown and outstrained—coal and gas storeage, yard room, carbonizing and purifying plant, all are dangerously overtaxed; and it is quite possible that Belfast may be in darkness next winter if ever so little goes wrong with the works. And, of course, everything has to be done in the costliest way in order to keep going at all. The truth has now been realized; and the Corporation are making such inquiries as should have been set on foot ten years ago. However, better late than never.

The strait in which Belfast now finds itself was disclosed by the reports prepared by Mr. Corbet Woodall and Mr. W. Foulis, as reproduced in our columns a fortnight ago; and the story is now completed by the report of Mr. Stelfox, which appears in another column. The main question is only as to where the new works are to be built; for everybody is agreed that new works must be provided. Unfortunately, a fresh difficulty is here disclosed. Belfast has not been kindly dealt with by Nature, in the eye of a gas engineer. Notwithstanding all that can be alleged to the contrary, gas engineers are in their professional operations a modest, retiring race. They prefer, whenever it is possible, to keep their works out of the ken of their fellow citizens—presenting to the latter only the net result, in the form of an abundant supply of good gas. In the case of Belfast, however, there is literally nowhere to put a new gas-works except in full sight. This consideration should not alarm the Belfast people, for they have always had the gas-works with them; and, in any case, the choice between a gas-works and a shipyard is not a thing to grow excited over. Yet the local sentiment has been stirred in a truly remarkable degree by this question of the new gas-works' site. There are, according to the reports of the unimpugnable experts consulted in this matter, only two possible locations for the new gas manufacturing station, which, wherever it is put, can hardly be got to work quickly enough to save the town from darkness. One of the sites is about as bad a piece of ground as could be conceived of—being alluvial land partially reclaimed by the Harbour Commissioners. Its recommendation is purely topographical; and even this depends upon the carrying out of some hypothetical harbour improvements. To fill up the place and found gas-works upon it, with ordinary precautions against disaster, will cost at the lowest computation £100,000; and this estimate may easily be swelled to a quarter of a million sterling.

The alternative site is so near the existing gas-works as to be practically an annexe thereto. It is declared by the Engineers to be all that could be desired; but—and the "but" is a terrible one to a gas-supplying authority dependent upon the popular vote—it is a corner of Ormeau Park, a regularly-dedicated pleasure ground. True, the Corporation are able to offer more than a *quid pro quo* for the needed land, in the shape of another piece of greater value; but it is hardly necessary to describe how the mere sound of a proposal to take a part of a public park for gas-making purposes supplies pabulum to the popularity-mongers of the town and district. And from the report that has reached us of the result of the deliberations of the Gas Committee, it really appears that this body does not feel strong enough to recommend the Ormeau Park site. Well, it is a question for those who will have to pay the bill. If the people of Belfast elect to throw £250,000 into the mud of their foreshore, and rearrange their harbour to suit, that is their affair. The Engineers will spend the cash for them to the best possible advantage. If, on the other hand, they treat the question as men of sound sense, remembering that Belfast will never be a pleasure town,

or make a farthing by her good looks, wherever the gas-works may be situated, they will reap the benefit of their wisdom in the tangible form of cheap gas and light rates.

Contractors and Corporations.

SOME recent events have lent a fresh fillip of interest to the well-worn topic of the responsibility of public bodies in the matter of the acceptance of the "lowest tender" for works of construction. We saw the other day how the Corporation of York got into difficulty through accepting the lowest tender for their sewerage works; and now again attention has been directed to the risks of this practice by the collapse of a bridge built at a "cutting" price for a Scotch County Council. Another matter bearing upon the same question of public policy, is the adoption by the London County Council and some other public bodies of the standing rule that their contractors shall pay the full standard rates of wages to their workpeople. In parts of the United States, it has also become the rule to restrict labour paid for out of the public funds to the eight-hour day, or the forty-eight hour week. All these things point in the same direction. It is an absurdity for national and local authorities to pretend to interfere in respect of the wages paid to workpeople by presumably independent contractors, while they keep up the practice of grinding these contractors down to the lowest penny for their work as a whole. So long as the economic principle of "buying cheap and selling dear" was esteemed as embodying the whole duty of the tradesman, it was logical to always give contracts to the lowest tenderers. It was not considered to be anybody's business to inquire whether the contractor paid his men well or ill; or how many people were ruined by, or made money out of, a particular job. The first restriction of this liberty of the contractor came in the shape of the usual prohibition of underletting—which, by the way, is too often a dead letter. It is certain, however, that underletting is the most fruitful cause of what is called "sweating;" because it is commonly the leanest contracts that are most frequently and deeply sublet. The reason for this lies upon the surface. If a business man thinks he has something good in a particular contract, he is not over-anxious to give it away; but if he sees that there is only the barest chance of coming well out of his engagement, he will look out for somebody who is able to cut things a little finer than he can himself, and in this way get rid of the entire responsibility for a small commission.

A glaring case of this nature came under our notice some time ago, in regard to an iron roof that was to be built as part of a gas-works contract. The roof went with the building contract; being considered too small an affair to form a separate contract. This was perhaps a mistake. But at any rate, the job was a very plain and simple one; and the builder obtained a conventional price for it. When the different contractors got to work, one of the firms who were doing other ironwork made inquiries about this roof, and offered to erect it upon terms advantageous to the builder, who accordingly sought permission to sub-let it. This was granted almost as a matter of course, especially as the sub-contractors were already under other engagements to the Corporation owning the gas-works. Difficulties subsequently arose over this bit of roofing; and —to cut a long story short—it eventually came out that the wretched little job had been sublet four times—the ultimate "contractor" being a poor hoister who had been out of work through illness for so long that he was glad to snap at anything in the way of his calling. The story is possibly of too common a type to convey a moral to some of our readers. The point that we desire more particularly to bring out by the tale is the connection between low tenders and sub-letting.

It is now high time that public bodies broke through the vicious tradition of the desirability of accepting the lowest tender for their work. If they can so far outrage the old economical rule of "let alone" as to inquire what rates of wages their contractors pay, it is surely open to them to assess by the help of their professional advisers a just price for the work which they let by contract. This reform would not do away with competition; it would tend to make contractors careful of their reputation for all-round fair dealing. And the duty of public bodies to pay fair prices for their work goes further than mere care for the workmen's wages, which may be inspired by regard for the "labour vote," or for other outsiders. It also extends to the salaries and wages paid through the intermediary of such bodies to public servants. It is small credit to a local authority that, for fear of the Trades Unions, it pays fair wages to its workpeople, if at the same time it takes advantage of their numerical weakness to underpay its officers. It is a shameful thing to see, as we continually do, public bodies advertising for officials who are at the same time requested to "state salary required." One could hardly blame the ribald person who should answer such a notification by offering to place at the disposal of the advertisers "all the virtues and accomplishments, "for nothing a year, *and the run of the cash box*." This is a subject upon which a good deal might be published without exhausting a tithe of what is said about it in private by the victims of the "cutting-down" system; but we will now leave it for the present.

Sheffield and Horseferry Road.

THE ordinary general meeting of the shareholders of the Sheffield United Gas Company was held this day week, Sir Frederick T. Mappin, Bart., M.P., in the chair. The Chairman's statement as to the position and prospects of the Sheffield undertaking was regarded by the meeting as most satisfactory; and so it was, having regard to the contemporary condition of the gas industry throughout the United Kingdom. In Sheffield, as elsewhere, the consumption of gas is continually increasing, but the amount of disposable profit is prejudicially affected by the state of the residuals market. That coke is worth less than it used to be in Sheffield is a noteworthy fact, because everything is done to prepare this fuel for the local market. Consequently it is reasonable to think that, if coke is unsaleable in Sheffield, it must be a drug indeed. Perhaps the most interesting part of Sir F. Mappin's address, for other than local readers, is that in which he continues the reproach of The Gaslight and Coke Company. Sir F. Mappin has assimilated all that has been recently advanced in the JOURNAL with regard to the causes of the decrepitude of anthracene; but he carries on the battle with the Horseferry Road administration with fresh ammunition of local manufacture. It is now sulphate of ammonia, in which Sir F. Mappin contends that the Sheffield Company beat the Chartered last year by about $4\frac{1}{2}$d. per ton of coal carbonized. Colonel Makins was great on "carriage" when heckled on a similar point last month; but carriage will not excuse everything, however useful at a pinch. A fresh display of the statistical ingenuity of the Horseferry Road apologists may be expected next February, to put a different aspect upon these Sheffield figures; but if Sheffield fails, there are doubtless a few little places which may be discovered to have sold sulphate to less advantage.

The Crystal Palace District Gas Company.

THE Crystal Palace District Gas Company will have to go to Parliament next session for further capital powers, which is the most important piece of news of the kind that has yet come to our knowledge. The announcement was made at the recent meeting of the Company by the Chairman, Mr. F. L. Linging; and the statutory meeting to obtain the consent of the proprietors to the Bill will be held in due course. It should be stated that the Company did better last half year than during the previous six months; but they were yet a long way from earning their dividend. The proportion of unaccounted-for gas, which had jumped up in a most perplexing fashion, has again become more reasonable; and the prospects of the Company generally seem to be as good as can be expected. It will be interesting to watch the fortunes of the undertaking in Parliament; for the character of the administration has for many years been liberal and far-seeing in no ordinary degree. It will, of course, be proposed to take the sliding scale; and the first subject for curiosity will be the initial price to be suggested and allowed. It is, of course, hazardous to prophesy; but, without knowing anything of the mind of the Board in respect to this matter, we are strongly inclined to believe that they will obtain the price they ask for. They will be too wary—and also, let us hope, too just—to demand anything so exorbitant as to arouse vindictive opposition from the responsible representatives of any portion of their extensive area of supply; and they have a claim to be spared from being sacrificed upon the altar of their own liberality. It will very soon be known whether any other large Gas Company

besides the Crystal Palace District Company intend going to Parliament next session; but there is a marked dearth of preliminary rumours and announcements respecting any such action.

The Eccles Gas Bill Dropped.

It was decided last Wednesday that Eccles should not proceed further with the scheme for making its own gas—the ratepayers in statutory meeting refusing to support the Local Board's proposal to promote a Bill with this object in the next session of Parliament. This being the second time that the voice of the local public has been given against such a scheme, nothing more will probably be heard of it. Salford has secured continued possession of the district by yielding in time one-half of the differential rate that had previously been charged to gas consumers in the outlying areas. A year ago the difference was 4d. per 1000 cubic feet; and Eccles then threatened a severance. Action was postponed, however, on the reasonable plea that no overtures had been made for a reduction of the surcharge. This has now been done, to the extent of 2d. per 1000 cubic feet; and therewith Eccles appears disposed to rest content. The district is not inclined to trouble itself with gas making for a matter of 2d. or thereabouts per 1000 cubic feet. The savour of gas making in that neighbourhood has not been so sweet in the recent past that a district which is largely residential can be supposed to experience a longing to enter into the business. Mr. Corbet Woodall assures the Eccles people that they could make a good thing out of a gas undertaking of their own; but they refuse the bait. It must still be understood that Salford is on its trial. Some astonishing statements have been published with regard to the quality of the Salford gas; and the Salford Gas Committee have done so many peculiar things that their reputation must be remade before one can say of them, with confidence, that they could not be guilty of this or that piece of sharp practice. If Salford henceforward treats the outdistricts fairly, there will be no revival of the late "unpleasantness;" but otherwise there will be more trouble in the future, because, after all, one local authority always chafes under the burden of helping to pay the rates of another, and very little aggravation of the grievance renders it intolerable.

The South-Western District Meeting.

The members of the South-West of England District Association of Gas Managers met last Tuesday at Bournemouth, under the presidency of Mr. D. Irving, of Bristol, who delivered the inaugural address which will be found in another column to a numerous and appreciative audience. This was practically the only technical business of the meeting; the deferred discussion upon the papers read six months ago by Mr. E. C. Riley, of Swindon, and Mr. Frank Clark, of London, being a somewhat perfunctory performance. The Association was hospitably entertained by the Directors of the Bournemouth Gas and Water Company; and an inspection of the gas-works formed part of the programme of the day. The President for the ensuing year is Mr. Riley; and the Honorary Secretary, Mr. Norton H. Humphrys, also becomes Vice-President. Some difficulty was found in selecting a place for the next meeting of the Association (which, by the way, is to be held in April instead of in March, with a view to securing kinder weather for travelling). In the end, a division was taken as between Swindon and London. The new President, being Gas Engineer to the Great Western Railway Company, has works under his charge in both places; and both he and Mr. F. G. Dexter spoke of the interesting character of the work done at the Wormwood Scrubbs station. The fact of the Association having met at Swindon rather recently also weighed with some of the members; and so eventually it was decided—by an insignificant vote of 11 to 7—to meet in London in April. The circumstance of the President having such a special connection with what is to all intents and purposes a London gas manufacturing station must, of course, be duly allowed for in considering this decision; but we nevertheless venture to pronounce it a great mistake. By no twist of logic can London be argued into a position within the "sphere of influence" of the South-Western Association. It is unquestionably true that all roads lead to London; and that a man, say, from Plymouth can get to London as well as he can to Bournemouth or Southampton. The South-Western district is a very straggling one at best; and it would be hard to name the town which would be the most convenient for the whole, or even for a majority of the members, to visit for the sake of a few hours' "shop" talk, which is the reason for the existence of the Association. Our own test for the suitability of a place of meeting of a District Association—that the majority of the members shall not be required to sleep out—fails lamentably in this generally delectable part of the kingdom. All the same, a visit to London by a distant association of gas managers is, on the face of it, such a sacrifice of the geographical proprieties that one wonders at the supineness of those who permitted it to pass by a vote of 11 to 7 in a meeting of an organization numbering nearly 80 members, perhaps half of whom were present on the occasion. This indifference on a vital point of policy does not argue well for the existence among the members of a lively interest in the proceedings of the Association.

WATER AND SANITARY AFFAIRS.

It is satisfactory to find that the geological facts connected with the London Water Supply will be carefully investigated by the Royal Commission in the future sittings of that body. Several eminent geologists have been asked to give evidence; and the authorities of the Geological Survey Office are preparing maps for the special use of the Commission. As explained by Mr. W. Whitaker last Friday, at the Congress of the Sanitary Institute held at Portsmouth, these maps will show the area of chalk available for water supply in the central and east parts of the London basin. According to the terms thus employed, the area seems rather too closely circumscribed; but we may trust that the Commissioners will give due scope to their investigations. This part of the subject is one of supreme importance, as affecting both the quality and the volume of the supply available for the Metropolis within a moderate radius. Another point—and one which is designed to precede the geological part of the inquiry—relates to the construction of storeage reservoirs for the collection of flood water in the valley of the Upper Thames. This involves engineering considerations, concerning which Mr. Thomas Hawksley will probably be a leading witness. Both the engineering and the geological part of the inquiry may be expected to prove highly interesting, and will have a very decided bearing on the main question as to the provision of an adequate supply in future years. In all that relates to this inquiry, it is a matter for congratulation that the task has been confided to a body which is independent of all political considerations. The change of Government can have no effect on a Royal Commission. Even if there should be a desire to enlarge the instructions under which the Commissioners act, this could scarcely take place without some intimation from the Commissioners that they find such an extension of their powers is necessary. It is possible enough that the existence of a "new Parliament" may encourage the County Council to advance some fresh ideas, concerning which we may be enlightened in the course of the coming month. But despite the powers conferred on the County Council by the London Water Act of the present year, the Royal Commission so occupies the ground that it is simply the duty of the Council to furnish any useful evidence it may have to produce. The "power to make inquiries "as to the existing supply of water within the Metro "politan water area," and "as to the possible sources of supply," must for the present be held subservient to the higher authority of the Royal Commission. At the same time it is difficult to say how far the County Council may attempt to go.

The interest taken in the leading features of the Metropolitan Water Supply is shown by the extent to which the subject is being discussed in the columns of the press. The presence of cholera in Europe may have contributed to excite public attention on a topic so intimately connected with the public health; yet the general impression with regard to the quality of the London water is evidently characterized by quiet confidence. Dr. Frankland's monthly reports continue to be of an encouraging nature. Although the Thames at Hampton was not quite in such good condition last month as in July, we are told that the water delivered from this source fully maintained "the high degree of organic purity" previously recorded. The water delivered in the districts of the New River and

East London Companies was even slightly better in August than in July. During the four weeks ending on the 10th inst., the Metropolitan death-rate was 1·3 per 1000 below the mean rate in the corresponding periods of the previous ten years. Mr. E. J. Watherston, in a letter to *The Times*, asserts that the water supplied by the London Companies "wants no boiling;" but he regrets that "for the most "part," and more especially in poor districts, "the foul "open cistern and intermittent supply system still prevail." This is not altogether correct. Fully two-thirds of the houses in the water area of the Metropolitan Companies have a constant supply, and the system is now adopted throughout nearly the entire district of one of them—the East London Company. Respecting the quality of the supply given to the Metropolis, the *Pall Mall Gazette* has lately published an interesting account of the manner in which the filter-beds of the London Companies are managed, including a description of the ingenious process for washing the sand which has been patented by the Engineers of the Grand Junction Water-Works Company. The patent was described in the JOURNAL for June 21 last (p. 1161). The conclusion arrived at by our contemporary is "that Londoners have little to fear from "the water supply, provided they consume it in as pure a "condition as it is supplied by the Companies." Unfortunately, the *Pall Mall Gazette*, while thus enlightening its readers, fails to enlighten itself; for three days after the publication of this satisfactory account, we meet with an editorial "Note" in that journal, describing "ordinary "effervescing lemonade," and asserting that "it is, to the "discredit of the Metropolis be it said, a much safer drink "than London water." Our own conclusion is this, that, if the lemonade is as good as the water, it is as much as can be expected. Perhaps the lemonade should be boiled, like the ice we heard of the other day. The public are beginning to be puzzled on this point. Milk is to be boiled; and doubtless this precaution is often needful. But some people are asking what is to be done in respect to butter and cheese, for these may retain microbes transferred from unboiled milk. Neither is it certain that boiling a liquid will kill the germs. The latest horror consists in the announcement that paper-money may convey disease. From two bank notes that had long been in circulation in the Island of Cuba, Drs. Acosta and Rossi are said to have obtained more than 19,000 germs of various kinds; and some of these were so virulent that they acted as poison on rats and guinea pigs. Are we to boil our bank notes, lest we inhale poison? It has been asked, "Where is the dust that was not once "alive?" The dust would seem to be still alive. If we wish to escape the microbes in their thousands, we must needs have recourse to London water, where we may find four microbes per cubic centimetre; and these four incapable of doing harm even to a guinea pig. As for softening our hard water, according to the recommendation of Mr. Alfred Fletcher, the magnitude of the supply seems to render this impracticable in the case of London. Neither are the advantages accruing from such a process likely to prove so general or so great as its advocates would appear to anticipate.

The Management of the Kendal Gas and Water Works.—Mr. T. N. Ritson, Assoc.M.Inst.C.E., who is at present Assistant Engineer and Manager at the Jersey Gas-Works, has been appointed Engineer, Manager, and Secretary of the Kendal Gas and Water Company. Before going to Jersey, Mr. Ritson was an articled pupil and assistant under Mr. J. Hepworth, M.Inst.C.E., at the Carlisle Gas and Water Works.

Mr. Thomas Cole, the Secretary of the Institution of Gas Engineers, has issued a notice to the members, in the course of which he says: "On behalf of Mr. Charles Hunt, President of this Institution, I have pleasure in inviting you to a meeting of the members, to be held on Tuesday, the 4th of October next, for the purpose of inspecting the systems of inclined retorts in use at the works at Windsor Street, Birmingham, and at Coventry. It is not proposed to transact any other business at the meeting."

Masonic.—We are asked by Mr. John Ely, the Secretary of the Abingdon Gas Company, to remind those who were good enough to promise their support for the case of Henry Reeves Harris for election into the Royal Masonic Institution for Boys, that a special effort is necessary at the forthcoming election to secure an exceptionally large number of votes, as this is the last chance there will be of getting the boy into the school. Votes for the other charities will be equally useful, as they can e exchanged; and voting papers may be sent either to Mr. Ely direct or to the JOURNAL offices.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 522.)

IT is not often, in the dead season of the year, that things in the Stock Exchange become as lively as they have been during the past week; and it is to be hoped that so disagreeable an experience will not often recur. Several causes, wholly unconnected, prejudicially affected the markets. The most exciting to the popular mind was the run on the Birkbeck Bank, which was followed by the failure of another Building Society. These failures—though of very inconsiderable importance in themselves—go far to unsettle men's minds, as well as to engender a general feeling of apprehension and distrust. Then the scare regarding the cholera plunged the American market into the lowest depths of despondency. Two or three failures also helped to thicken the gloom; so that, altogether, the week has not been a happy one, though there was a rather better tendency at the close. Of course, with things in this state, there is no inducing the public to look at anything but "gilt-edged" securities. Consols are even higher, notwithstanding that a good round sum was hastily sold by the Birkbeck Bank, and everything first-class is in brisk demand. Money is so plentiful as to be nearly without a value; and almost any amount could be borrowed on, practically, any terms. The Gas Market, so far as the ordinary stocks are concerned, has been quiet; and prices for the most part are firm and unchanged. Gaslight "A" was done pretty well every day at 217½—18½, with one special bargain at 220. The debenture, preference, and limited issues were naturally active and in good favour; and the quotations of several advanced. Very little was done in South Metropolitans; but the few transactions marked showed good figures. In Commercials, only the debenture stock was wanted. The few dealings recorded in Suburbans and Provincials show general firmness; but, beyond this, they offer no special feature. The Continental Companies maintain their positions well; and European is ½ higher. Of the rest, none were noticeable except South Americans, which experienced a further fall. The Water Companies were quiet and devoid of interest. Nothing moved but Lambeth, which reverted to its position of the week before.

The daily operations were: The Gas Market opened strong, and was as active (especially for secured issues) as on any day of the week. Gaslight "H" rose 2½; but Malta and San Paulo had a fractional fall. In Water, Lambeth receded 1. Tuesday was quiet, but very firm. On Wednesday, the demand for high-class securities sent Gaslight debentures up 1. Thursday's business was very limited; and the only change was an advance of ½ in European fully paid. Friday was even quieter, and no change whatever occurred in quotations. Business was very limited on Saturday; but increased firmness in leading stocks was the feature. Gaslight "H" and "J" rose 2 each. South Americans were flat; Buenos Ayres and San Paulo each falling ½.

ELECTRIC LIGHTING MEMORANDA.

The Bradford Electric Lighting Undertaking—A Prize for Electrical Research—The Cost of Electrical Cooking and Heating—The Central Electric Lighting Station for the Adelphi District.

THE official statement of Alderman Priestman, respecting the last half-year's working of the Bradford Corporation Gas and Electricity Departments, will be found in another column. The appearance made by the electric lighting undertaking is somewhat remarkable. The total liabilities of the concern, by way of loans, at present amount to £42,342; and there is a further sum of £47,836 described as floating liabilities. If these sums may be added together, and increased by the amount paid off through the sinking fund, it follows that this electric lighting experiment, which began in a sufficiently small and cautious way, has stood the Corporation in very nearly £100,000 all told. Last half year there was an outlay of £1573 upon revenue account, and £3216 was earned; thus leaving a trade profit of £1642. Out of this, interest and redemption had to be provided for; leaving a net profit of £387. We assume the plant to be fully kept up out of revenue, before any balance is struck. The curious thing is that, whereas a progressively decreasing loss upon working was converted into a net profit of £970 at the end of last December, the profit has fallen again to the low figure of £387 already given. Alderman Priestman thought matters would show up better by next March, when the accounts for the current half year come to be made up; but there does not seem to be much hopefulness in his tone. Of course, these things may be explained quite naturally, and the electricity supply may be recommending itself more and more to the people of Bradford; but the figures now before us do not, on the face, indicate anything of the kind.

Some time ago, we recorded and commented upon the action of the Paris Municipality in offering a number of money prizes for the best electric meter. The principal award was secured by Professor Elihu Thomson, and the amount (5000 frs.) has been devoted to the development of the theoretical knowledge of electricity—a very worthy object, which does not participate

with the practical branch in those pecuniary rewards that have not been denied to Professor Thomson. The selection of the subjects for the new competition, the examination of papers, and the adjudication of the prize has been confided to a Committee, who have decided that the theory of electrical condensers shall first receive attention. Some of our contemporaries, in noticing the matter, do not express themselves at all hopefully of the result. One journal remarks that the custom of offering prizes for essays "or other scientific work" is a "peculiarly French idea," and declares that it "cannot, on the whole, be said to have elicited anything of great value." The custom in question is certainly carried to greater lengths in France than elsewhere; the Academy of Sciences and other bodies of the same class having large prize funds which they administer at discretion. Most of this money appears to be wasted, from one point of view; but the same is often said of money given in the form of alms. Whether any of it is indirectly productive, is a question not to be answered off-hand. We do not admire the prize system; but a satisfactory method of applying money in aid of research has yet to be devised.

Some small sensation was created at the Crystal Palace Electrical Exhibition by the display of electrical cooking and warming apparatus by the Crompton Company. The same thing has since been done in miniature upon lecture platforms in various places, and has been referred to as positive evidence that "in the future" electricity will do everything that is now done by gas, only better. No statement of the expense of these heating and cooking demonstrations has ever been made—the result has been paraded, while the means have been kept in the dark. These experiments remind us of the popular demonstrations that used to be given, when steam hammers were a mechanical wonder, of the ease with which the most powerful of these machines could crack a nut. We do not remember, however, that nutcrackers of this pattern were ever recommended as things of which no gentleman's house should "in the future" be destitute. Well, as the nut is to the steam-hammer, so is the chop to the dynamo. Some observations bearing upon this subject recently appeared in the *Engineering and Mining Journal*. The writer, Mr. Stephen H. Emmens, referring to newspaper statements respecting the nearness of the day when houses will be warmed and food cooked by electricity, shows by indisputable figures that, upon the most favourable data, to heat a room by steam-generated electricity requires the consumption of over 21 times as much coal as would be needed for an ordinary stove or fireplace. It would also be nearly 14 times more wasteful of fuel than an ordinary steam heating plant, such as is commonly used in America.

The plant and central station arrangements of the Electricity Supply Corporation has furnished the subject of an illustrated descriptive article in the *Engineer*. This concern is not the Deptford venture, which it so closely resembles in name; but is a comparatively small affair confined to the region of the Adelphi, in the Strand, where it began in some private lighting by Messrs. A. and S. Gatti, the well-known restaurateurs and theatre proprietors. There really ought to be some system of controlling the naming of these electrical speculations, for some of them run so much alike in their titles as to render it difficult to distinguish one from another. Nomenclature, however, has always been a weak point with electricians, whether of the commercial or the philosophical variety. To return to this newest of the electrical "corporations," it may be remarked that, if there is any profit to be made out of theatre and restaurant lighting, and the "night" class of the trade generally, this Adelphi speculation ought to be able to secure it. The class of business for which the Company is laid out is, in short, the complete opposite to that which the City of London Company will have to depend upon, and which Sir David Solomons professes to regard as the most profitable that any undertaking of the kind could possibly desire. It is unnecessary to describe the Maiden Lane plant here; suffice it to say that it has been designed by Mr. H. A. Earle, the London agent of Messrs. Mather and Platt; and nothing seems to have been spent upon ornamental officers or "for the fancy." At present 27,000 8-candle lamps are on circuit, which last year earned the high revenue of 21s. per lamp—the best, we believe, on record. The capital of the Company is £150,000 in shares, all paid, and £70,000 of debentures. A 5 per cent. dividend has just been paid; and the shares stand at a premium. Few companies of the kind can show such good business as this.

Incorporated Association of Municipal and County Engineers.—We have received from the Secretary of this Association (Mr. T. Cole, Assoc.M.Inst.C.E.) a programme of the arrangements for the next meeting, which is to be held in Belfast on Friday and Saturday next. The former day will be devoted to a visit to the Belfast Water-Works, under the guidance of the Chairman of the Water Committee of the Corporation (Mr. R. Corry). At the business meeting on the following day, a paper on the "Progress of Municipal Affairs in Belfast" will be read by the City Surveyor (Mr. J. C. Bretland); and one on "Londonderry, and its Engineering and Sanitary Progress," by Mr. W. J. Robinson, Assoc.M.Inst.C.E., who holds a similar position in that city. Visits will be paid to the main drainage works, where luncheon will be provided; and the meeting will close with a reception by the Lord Mayor and Lady Dixon.

A BIBLIOGRAPHY OF COAL GAS.

It has long been apparent that one of the most difficult things that a professional man has to do is keeping up the necessary acquaintance with the bibliography of his profession. The lawyers' lament over the impenetrable and ever-growing mass of reported cases and prints of statutes, through which counsel and judges have so painfully to wade if they are to settle suits by good law, is echoed from all sides. Professional men usually give up the reading of text-books with the expiration of their pupilage; but they keep in remembrance the sources of the technical information which they have more or less perfectly assimilated during this period of their existence, and can generally refer upon occasion to the exact page of the well-turned volumes that rest upon their book-shelves, if a little rub-up is needed. By far the most important, and all the newest information required by the followers and practitioners of a living, progressive art or science is, however, contained in technical journals, periodicals, and the published records of special societies. Men who seek to be "in the movement" must therefore keep their technical reading well up to date; but however conscientiously they may endeavour to do this, it is inevitable that something should now and again be missed. Those are the wisest men who know precisely what journals and periodical publications to look at; for in this way it is possible to avoid wasting time and spending money upon a host of paste-and-scissors reproductions. Looked at from one side—the side of an eager student of some particular speciality of art or science—the amount of really original and instructive literature that comes to light respecting the subject matter, may be so small that he may be pardoned for thinking that he knows the whole of it. In the more general case of an all-round man, however, who needs to keep up a cursory acquaintance with several specialities connected with his calling, no such burdening of the mind is either possible or desirable. All that such a man needs is the assurance that, when he requires a certain class of information, or a particular set of data, he shall be able to lay his hand upon the matter.

How to do this is the question. To take the professions connected with the gas industry as an illustration. The headquarters of the Journal are constantly being applied to by people who want to know all sorts of things, which a memory charged with the contents of the whole 60 volumes which we have published during the last forty-four years could alone satisfy off-hand. It is by no means an unusual occurrence for inquirers to address to us queries which would entail the devotion of hours of consultation of indices to satisfactorily deal with. We are always pleased, of course, to afford any reasonable facilities to subscribers and readers who desire to know what the Journal has contained with reference to particular subjects; but sometimes it is practically impossible to satisfy inquirers who wish for references to "everything that has appeared about steam-roller catastrophes," or some such matter.

The fact is that the time has come for the compilation of a Bibliography of Coal Gas. We have suggested more than once that this is a duty which the technical societies connected with the gas industry might long ago have taken in hand. Some of them have undertaken the formation of reference libraries; and this is undoubtedly a good work. No library is ever complete, however; and the best catalogue of the best library says nothing about the books and pamphlets which are *not* to be found there. Yet this is often the very information students desire. A good bibliography is a guide to all libraries and book-shops; and without it the barren facility of access to the best collection of books is not worth much. The technical societies have not moved in this matter; and it might consequently have been thought that a Bibliography of Coal Gas would have been to seek for an indefinite time. The want has been felt, however, by at least one gas engineer who believes in the principle of self-help; and we have the extreme gratification of introducing to readers of the Journal the first subject-matter index of publications relating to the gas industry, which, as notified in our last week's issue, has just been brought out by Mr. W. R. Chester, the Engineer and General Manager of the Nottingham Corporation Gas Department.* Reference was made to this work of Mr. Chester's at the last meeting of The Gas Institute. It is a striking indication of the importance, as well as the arduous character of the task of keeping up with the growth of technical literature, that this first edition of Mr. Chester's Bibliography, although extending to 232 pages, only covers the publications of the period 1880-91 inclusive. The author declares his intention of continuing the index up to date, and also at some future time "to carry it back to the earliest publications on gas matters." Whether he does this himself, or leaves it to be done by others, we desire to duly express here the indebtedness under which the whole personality of the gas engineering profession lies to Mr. Chester for what he has already done in this matter.

The author tells us that he commenced his Index in 1884 for his own purposes, and with a view to saving the labour involved in searching our pages and other publications for technical information. He set himself to make an index "which should not only indicate at a glance the source of the particular

* Bibliography of Coal Gas; A Subject-Index to Interesting Matters Published in Connection with Coal Gas to the End of the Year 1891. By William Reginald Chester, of Nottingham. 1892.

information required, but should give in a concise form reference to all the matter published on that particular subject." He then tells how he did this, and how the result proved to be of the greatest possible value to himself; so that when friends got to hear that he was in possession of such a useful key to the treasures of contemporary technical literature, they urged him to permit the public to acquire this precious facility. We consider that Mr. Chester has been well-advised in so doing; and have small doubt his name will be perpetuated among those of the true benefactors of his fellows.

The arrangement of an index is a subject of nice consideration. Mr. Chester has adopted the best known method of classification for heterogeneous subjects. The initial letters of the subjects are, of course, entered in alphabetical order, and then the titles are sub-divided in the order of the vowels first following the initial letter; so that we have the names of the subjects thus classified—

Ba. Barometric Corrections, Blast Furnace Gases, &c.
Be. Benzol, Benzene, Breeze Furnace, &c.
Bi. Bisulphide of Carbon, Briquette Fuel, &c.

With a very little practice, an index so constructed can be consulted, and an entry found, with great rapidity. So far, good. The volume is also clearly printed: and some blank pages are appended in order that additions may be made by users whose needs do not coincide with those of the author.

This consideration leads us to the inevitable criticism. A work of this kind is calculated to be useful so far as it goes; the question that now arises is as to whether the execution of Mr. Chester's scheme is commensurate with the possibilities of the case. There is the same doubt and difficulty in compiling a Bibliography as there is in writing up a diary, or in the copying of letters. Is everything to be entered; or is a selection to be made? If the latter course is decided upon, what principle is to guide the selection, so that nothing of real importance may be left out? There may be an objection to overloading the record with a mass of unimportant matter; but this is obviously a minor fault in comparison with that of leaving out something worth preserving. It is for this reason that the majority of men of business have every letter they send out copied and indexed. The vastly greater number of these records are of no specific value; but the satisfaction of knowing that nothing escapes the letter-book is unspeakable, for any man who has ever tried the other system and found it break down, as it is sure to do, just when most needed. There is no reliable way of discriminating at the time between important and unimportant correspondence; consequently, it is best to run no risks. This is a commonplace of business establishments; but the same kind of question crops up in regard to such a work as Mr. Chester's Bibliography. Is it to embrace everything in the shape of technical literature appearing within a stated period; or only a selection? Many, perhaps most, people would say that a judicious selection ought to meet the case here; and we admit that in a subject-matter index which takes cognizance of periodical publications as well as of printed books, one cannot expect all ephemeral matters—such, for example, as passing correspondence and editorial comments upon matters of temporary interest—to be included. But once sanction the principle of selection, however, and the character of the selection becomes a subject for criticism. This book of Mr. Chester's is the first of its kind, and the next edition may be expected to show an improvement upon it in many respects; so we have no desire to pick out shortcomings for the sake of fault-finding. It does appear to us, however, that what was doubtless completely satisfactory in a private memorandum jotted down by an engineer for his own purposes, is not necessarily full enough for a Bibliography intended for general use by men of more than one profession. Mr. Chester will perhaps bear this observation in mind for future application. Take the subjects of "Amalgamations and Transfers," for instance, which we duly find collected together, as promised in the Preface, under the index "Aa." Here we find a reference to the West Bromwich severance, but no mention of the three later transfers. Again, in the list of Metropolitan amalgamations, while there are two references to a fusion of the London and the South Metropolitan Companies, which never took place, there is none to the consummated absorption of the former undertaking by The Gaslight and Coke Company. Moreover, while it has not escaped Mr. Chester's notice that there was a proposal for an amalgamation of the South Metropolitan with The Gaslight and Coke Company, he ignores the complementary suggestion for the acquisition of the latter by the former. Then it is hardly correct to index the Stoke and Fenton transaction as something "proposed," seeing that it really took place. Perhaps also we may be accused of being "too particular" in remarking that the plural number should have been employed in referring to the transfer of the Edinburgh gas properties to the Corporation; and what of Glasgow and the Partick concern, never mentioned, nor Brighton, to say no more? A most fastidious accuracy is necessary in a Bibliography, if the compiler is to earn the credit of having done his work in the best possible manner. This "Amalgamations and Transfers" list, occurring moreover on the second page of the book, is certainly imperfect.

Then Mr. Chester has omitted all reference to patents, which is rather a pity; but the omission is not inexplicable. We cannot pretend to test the accuracy of the references, or their completeness. Some matters are unaccountably ignored—among them the Lothammer gas project, which was not a scheme to be overlooked; neither is the Maxim-Clark carburetting process mentioned. Indeed, the selection of subjects appears to have been done very arbitrarily, which is to be deplored. There is a plethora of duplicate or multiple references of the same matter to different sources, which appears to us in most cases to be superfluous. The orthography, especially of proper names, shows want of care, which is a rather serious failing in any work of reference, but is particularly objectionable in an index. Another time, also, it would save space and printing, and conduce to clearness, if Mr. Chester would add to his prefatory explanations a little list of the publications to which he means to make most frequent reference—such as the JOURNAL, the Transactions of The Gas Institute, and of District Institutions, &c., and would then refer to them by their chief initials, as "J. G. L.," "T. G. I.," "T. D. I.," and so on. It has a slovenly appearance to refer in print to a "Gas Journal" which has no existence, although the term is well enough understood colloquially; and such a reference as "Gas Assoc. Trans." is, to say the least, cloudy. We do not wish to be understood to offer these remarks with any desire to depreciate the value of Mr. Chester's work, which, we say once more, is calculated to be of great use so far as it goes. It is yet far from perfect, either in scope or in execution; and we have the single desire to see it improved in the future editions which will certainly be called for.

Waverley Association of Gas Managers.—The 63rd half-yearly meeting of this Association was held at Peebles on the 8th inst.—Mr. J. Black, of North Berwick, presiding. The Secretary (Mr. G. Taylor, of Jedburgh) having read the minutes of the previous meeting, the President gave a short address, dealing mainly with the subject of back-pressure on the retorts, which led to a good discussion. After the business, a visit was paid to the Peebles Gas-Works, under the guidance of the Manager (Mr. A. Bell). A specially interesting feature of the works was the apparatus in course of erection for making oil gas for enriching purposes. At the close of the visit, the members and friends dined together at the Tontine Hotel. Mr. Black occupied the chair; and the croupier's duties were discharged by Mr. J. Smith, of Rosewell. The principal toast—"The Waverley Association"—was proposed by Mr. Adamson, who stated that, as its opening meeting took place at Kelso on the 5th of August, 1861, it was the first association of gas managers that was ever formed. Mr. W. Robson, the oldest member of the Association, suitably replied; and in doing so he confirmed Mr. Adamson's statement. After dinner, the party had a drive in the neighbourhood of Peebles. The next meeting is to be held at Dalkeith; and the following one (September, 1893) at Selkirk.

The Coal Deposits of Victoria.—The "Victorian Year Book" for 1890-91 contains some interesting particulars respecting the coal-mining operations which have been undertaken in the colony. It appears that, as a rule, the seams hitherto worked have been too thin to yield a profit. The reported discovery of thicker seams, however, and of large deposits of brown coal, chiefly in South Gippsland, led to the appointment, in July, 1889, of a Royal Commission, with instructions to "inquire into and report as to the best means of developing the coal-mining industry of Victoria." This Commission has brought up a progress report, in which several seams of true coal, situated in different localities, are referred to, varying in thickness from 2 feet to 4 ft. 6 in.; and in the annual report of the Secretary of Mines for 1890, it is stated that a seam of 3 ft. 2 in. was discovered at Boolarra, and six seams at Korumbarra, varying from 2 ft. 6 in. to 4 ft. 11 in. in thickness of good coal. Early in 1891 the continuance of the Yambunna seam, nearly 5 feet in thickness, and the discovery of a seam, said to be even thicker, at Korumbarra, were reported; and coal mining at the two places named was being actively carried on. The deposits of brown coal, or lignite, in Victoria, are practically unlimited, and are thought to represent the largest supply of fossil fuel known in the world. The Coal Commissioners, in their first progress report, mentioned one mine in which the thickness of the deposits ranged from 60 to 200 feet. They say that the brown coal differs materially from the black, both in appearance and character. Its principal drawback arises from the quantity of moisture it contains, and the fact that the gas extracted from it is of low luminosity. A second progress report gives the result of a series of practical experiments, with a view of ascertaining its value for manufacturing, domestic, and other economic purposes. In regard to its yield, it was found that, although from 6447 to 15,083 cubic feet of gas were obtained per ton, the highest degree of luminosity was only 9·3-candle power; and in some cases it was *nil*. For steaming purposes, it required from 2·16 to 2·42 tons to do as much work as a ton of small Newcastle coal; while more stoking was necessary. Its comparative value for heating purposes was estimated at 8s. 4d. per ton, as compared with 15s. 7d. for Newcastle slack. At the present time the coal-producing colonies of Australasia are practically New South Wales, New Zealand, and Queensland, while small quantities have been found in Tasmania and Victoria. In these more than 4,000,000 tons of coal were raised in 1890; but three-fourths of this quantity came from New South Wales.

NOTES.

The Use of Coal Tar with Wood Paving.

Dealing with the experiences of the engineers to the London Vestries in the matter of street paving, our contemporary *Engineering* recently remarked that the tendency is in the direction of reducing the width of the joint between the stone sets, or the wood blocks, and towards the extensive use of coal tar and coal-tar pitch for saturating and jointing the latter. In Norfolk Terrace, W., Mr. Weaver, the Surveyor to the Kensington Vestry, has laid alongside each other broad strips of pavement composed of wood that has been subjected to different methods of treatment. One of these strips is composed of wood blocks dipped in coal tar, and laid as close together as they will go. On either side are wood blocks laid with the ordinary 5-16ths inch joint, filled in with cement grouting. These strips of pavement were laid at the same time, from picked wood of one quality; and the jointless strips of tarred blocks now stands out above the others as showing the least wear and the smoothest surface. Anyone standing near, even looking away from the street, can tell at once, from the sudden diminution of the rumbling sound, when a vehicle has passed from the wood laid with open joints to the wood laid jointless in tar. This reduction of rumbling means reduction of wear and tear, both of roadway and of the traffic. Throughout the Marylebone district, Mr. Henry Tomkins, the Parish Surveyor, has for the past nine years laid all his wood pavements with plain blocks touching each other, and rendered impervious to moisture by having a quantity of hot coal tar poured over their surface when in place. The whole of Oxford Street is paved in this way; and the fallacy that an open joint is necessary to enable horses to get a good foothold is here apparent. It is stated that there is no longitudinal swelling with close-laid tarred wood paving; but transverse swelling has always to be provided for by leaving from 1 inch to 3 inches room for expansion on each side (which may be temporarily filled in with sand) between the newly-laid wood blocks and the kerb. Curiously enough, stone sets are always laid in London with cement, and in the northern towns with pitch.

A Hydrocarbon-Gas-Black Machine.

A machine has been patented in the United States by Mr. Lester J. M'Nutt, of Warren, Pennsylvania, for the recovery of what is usually termed lamp-black from burning gas. The idea of the machine is to expose a series of long narrow metallic plates to contact with corresponding rows of gas-jets. The "hydrocarbon-gas-black," as the patentee calls the resultant product of this operation, is then scraped off automatically by causing the collecting-plates to move in a reciprocatory sense over suitably-disposed scrapers, and is placed into hoppers, whence it is removed by an endless conveyor. The principal claim of the inventor is for "the combination, in a hydrocarbon-gas-black machine, of a series of narrow parallel longitudinal plates, having a reciprocal motion forward and back over a series of gas-jets; a series of hoppers located apart from each other and under the plates substantially the distance of the traverse of the plates, and an endless conveyor for removing the accumulated black from the bases of the hoppers." It has frequently been contended by gas engineers that the excess of hydrocarbon in gas more often goes to make dirt than anything else, but it is somewhat surprising to learn that the systematic collection of deposited carbon from gas-flames is regarded anywhere as likely to form the basis of a paying industry. In this event, both the light and the heat of the gas consumed would be treated as bye-products.

The Cost of Riveting.

Some particulars respecting the cost of field riveting, or riveting done outdoors in the erection of ironwork, have been collected by Mr. L. Foster, of the University of Illinois, and are published in the *Technograph*. The ordinary riveting gang consists of two strikers, a holder-up, and a heater. The amount of riveting such a gang can do depends on the class of work, the accessibility of the rivets, the number of rivets in the joints, and the character of the men. There is practically no difference between steel and iron riveting, when men become accustomed to using the steel. The number of hot rivets driven and snapped for a day's work may vary from 125 to 500. An inspector of bridge-work in the United States puts the cost at from 4¾ cents to 10 cents for ⅞-inch rivets, according to position, not inclusive of the cost of scaffolding. The Berlin (United States) Bridge Company estimate the cost of riveting at 10 cents per rivet in place, which seems to be accepted as a fair inclusive rate, taking all joints together. According to the contractor for the Hawkesbury Bridge, the cost of the field riveting in this work was not far from 10 cents per rivet, while many cost double. According to Sir Benjamin Baker, the flooring rivets of the Forth Bridge were all closed up by portable hydraulic riveters, and cost 60 cents per 100 rivets. He gives 2 to 3½ cents as the cost each for rivets hand-driven in joint-plates. For ironwork other than bridges, the usual estimate in America is 4 cents per rivet, labour only.

Mr. John Sproxton has been appointed Secretary of the Hong Kong and China and the Colombo Gas and Water Companies, in succession to the late Mr. C. E. Walduck.

TECHNICAL RECORD.

SOUTH-WEST OF ENGLAND DISTRICT ASSOCIATION OF GAS MANAGERS.

The Thirtieth Half-Yearly Meeting of this Association was held last Tuesday, at the Bournemouth Gas-Works, under the presidency of Mr. D. Irving, of Bristol. Although, in order to arrive at this fashionable watering place, many of the members had to undertake long and circuitous journeys, by mid-day there was a very fair muster; and, the weather being fine, the arrangements planned by the Committee, in conjunction with Mr. W. J. Fuller (the Manager of the Company), passed the day in an agreeable manner.

The members found a substantial luncheon had been kindly provided for them by the Directors; but they were sorry to learn that not one of those gentlemen, owing to other engagements, was able to be present. However, after the repast, they took the opportunity of drinking to the success of the Company; and Mr. Fuller, replying as their representative, said that he regretted very much that the Directors were unable to be at the meeting. Some of them had intended to be present; but, unfortunately, they had been prevented. He could assure the members that it gave them great pleasure to entertain the Association, because they believed that the work done by it was beneficent to the gas industry at large.

Inspection of the Works.

Before commencing business, the members were conducted round the works by the Manager (Mr. W. J. Fuller), who had much to show them of an interesting nature. The works are situated some little distance out of the town, and consequently do not suffer from want of room; and although they have recently been, and are still being, largely extended, the Company have plenty of space left for additional plant when required. The party first visited the new stage-floor retort-house, which, with the coal-stores on either side, measures 175 feet long by 120 feet wide; and it has overhead viaducts for the transmission of coal, &c., complete. Most of the visitors appeared to be especially interested in the construction of the regenerator settings and the brick retorts in use; and they spent some time in examining them and obtaining information as to their durability and results. Their attention was next turned to the working of large coal-shoots on the railway embankment, in connection with which are timber staging and iron viaducts for putting the railway into more direct communication with the coal-stores and retort-houses—all carting of coal being now abolished. A set of purifying plant has lately been put down, for dealing with 1¼ million cubic feet of gas per 24 hours—consisting of condensers, purifying machine, exhausters, and a set of seven 25 feet square purifiers, raised on girder floor, with columns, roofs, lifting apparatus, oxide lifts, valves, &c., complete. These having been inspected, the company paid a hurried visit to the new gas-holder tank now in course of construction. This is 152 ft. 6 in. in diameter and 38 feet deep; and the holder (which will probably be erected next year) will be 150 feet in diameter, and will have a capacity of nearly 2 million cubic feet of gas. There have been many other extensions of a minor character, which these additions to the plant have rendered necessary—viz., a new meter-house and meter, a new tar and liquor storeage tank, the removal of much old plant and buildings, and re-arrangement generally, with a view to future growth. A new coke-floor and coal-stores will shortly be erected on foundations partly prepared. It should be mentioned that the whole of the extensions and alterations have been carried out, during the past three years, from the designs, and under the supervision, of the Company's Consulting Engineer (Mr. F. S. Cripps, C.E., of Sutton). As an indication of the rapid growth of the business of the Company during late years, the following figures will prove interesting: In 1885, the make of gas per annum was 97,764,000 cubic feet; and in 1891, 197,336,000 feet—the maximum daily output being respectively 494,000 feet and 1,135,000 feet. The number of mouthpieces at work in 1885 was 90; and in 1891, 171—the average make per mouthpiece being 5400 feet in the former, and 6634 feet in the latter year. In 1885, the coal carbonized amounted to 9585 tons, and in 1891 to 18,605 tons. Clay retorts (measuring 9 ft. by 22 in. by 15 in.) were in use in 1885; and last year the brick retorts (which are 10 ft. by 21 in. by 15 in.) were at work. The direct method of firing was in vogue in the first-named year; and the regenerator system (Brentford pipe setting) is now in use.

On returning to the meeting room, the formal business was first disposed of.

Minutes of Last Meeting.

The minutes of the meeting held at Bristol in April last were taken as read.

A Point of Order.

Mr. F. C. Taylor (Shanklin) and Mr. William Lowe (Weymouth) having been appointed Scrutineers of the voting-papers for the election of officers for the ensuing year,

The President remarked that having thoroughly discussed

the matter, the Committee could see no reason why Mr. Humphrys should not occupy the position of Vice-President and the office of Secretary and Treasurer at the same time. He had no doubt this would be agreeable to the members.

Mr. T. W. R. WHITE (Sherborne) raised a question as to whether they were in order in proceeding with the election of office-bearers, as, by Rule 31, a list of the members ought to be forwarded by the Secretary to each member, and on this occasion the rule had been infringed, as a list had not been sent.

The SECRETARY (Mr. N. H. Humphrys) pointed out that a list was only sent once a year—before the spring meeting.

The PRESIDENT thought the rule had been complied with; but to meet Mr. White's objection, he suggested that in future a list of the members should be printed on the back of the *agenda* paper for each meeting.

THE ACCOUNTS.

Mr. HUMPHRYS then submitted his statement of accounts for the year ending Aug. 31 last. These showed that the receipts amounted to £53 5s. 2d.; and, after meeting the various expenses, a balance of £1 2s. 10d. remained.

ALTERATION OF RULE.

Mr. S. W. DURKIN, in accordance with notice, moved a resolution altering Rule 11. He said this had been a subject of conversation between members for some time past. It had generally been found that, when they held their meeting in March, the weather was anything but propitious; and this year it was found absolutely necessary to call a formal meeting, and then to adjourn it to April. Their experience of bad weather in March showed the desirableness of changing the time of meeting; and he proposed that the rule be altered to refer to the second Tuesday in April, instead of March.

Mr. A. THOMAS (West Cowes), in seconding the motion, expressed the opinion that the third Tuesday would be better than the second.

Mr. E. C. RILEY (Swindon) thought the Committee ought to have a little discretionary power in this matter, as the second Tuesday might clash with Easter.

The PRESIDENT proposed that the rule should be altered so that the meeting could be held on any Tuesday in April at the discretion of the Committee.

Mr. DURKIN agreed to this; and the motion was amended accordingly, and carried.

The PRESIDENT then read the following:—

INAUGURAL ADDRESS.

Gentlemen,—I have to thank you for the very high honour you have conferred in electing me to be your President. I feel very conscious of the responsibilities pertaining to the office, and am fully mindful of the able and experienced men who have preceded me in this chair. It will, however, be my endeavour to follow, as far as I am able, their example in promoting, in whatever way I can, the real usefulness of this Association, as a technical and social combination.

In these days of multiplying Associations, Institutes, and well and ably conducted technical journals, in the one or other of which every new idea, plan, or discovery that is likely to be of use or interest to those engaged in the gas industry is at once produced, in a manner that does credit to the generosity and enterprise of those contributing to this supply of information, suggestion, and helpful criticism, the task of preparing an address that shall present to you any new plan or process, or yet to present old ones that have not become thoroughly threadbare, is a somewhat difficult matter.

It is usual, on such occasions as these, to "ring the changes" upon the Board of Trade Returns or Field's "Analysis," and note the growth of the industry, the immense amount of capital involved, or the great progress made in the manufacture of coal gas, as seen in the wide difference between gasholders built during the first ten or twenty, and the last ten years of this century. There has doubtless been great progress made during the latter part of this century, more especially in constructive engineering and in the chemical and commercial knowledge brought to bear upon the manufacture and administration of gas undertakings. Yet it must be admitted that there has not been during the past sixty years any fundamental change in the various appliances used in gas manufacture. The form of retort and arrangement of setting originated by Peckston at Westminster in 1816, with its five retorts set two above three, and heated with two or three furnaces, its mouthpieces, ascensions, dip-pipes, and hydraulic main arrangement, are in all essential principles the same as are in use throughout the country at the present time, excepting the material of the retorts. Or take the original and ingenious arrangement of four dry purifiers having hydraulic centre-valves to work the purifiers consecutively, patented by John Malam in 1823, and it will be found that they have never been superseded, except, perhaps, with regard to the modification of the valve. Or take the gasholder designed, and I believe erected by the elder Clegg at Bristol in 1819. This holder was without counterbalance weights, and had a capacity of 43,000 cubic feet—the largest then existing; and yet, in its main features, excepting the telescoping, this holder will not materially differ from the 5½ million holder now in course of erection in the same town. There is just a fear that we, coming in as it were on the flood-tide of success, may delude ourselves as to our true position in regard to that success, and forget what is due to the originators and pioneers of the industry.

No one can look into the history of the period to which I have referred without being impressed with the little progress that has since been made in the main features and methods. Works have, of course, grown in magnitude; but size is merely a matter of comparison, and, in itself, is no merit whatever. After the industry had become fairly floated, or established by Peckston, Malam, Clegg, &c., I cannot but think that the monopoly enjoyed by the companies, and the entire absence of competition, where parliamentary powers were enjoyed, seem to have destroyed that "necessity" which we are told is the "mother of invention." The facility and ease with which the selling price of gas could be raised and maintained, could not be considered an unqualified advantage. Mr. Newbigging, with that frankness which is characteristic of him, makes bold to say that the apathy of those administering gas undertakings during a certain epoch was very apparent, because they failed or neglected to adopt improvements that had been successfully and clearly demonstrated. I have often heard the charge made that gas people were very conservative, and slow to move. It was only somewhat natural that companies, with a sense of their responsibilities to their shareholders and the general public, should hesitate to adopt every new-fangled method presented by enthusiastic inventors, especially when it is remembered that for years some companies were unable to earn a cent of dividend; yet it is difficult to account for the slow adoption, and even strong opposition, to decided improvements in manufacture, as, for instance, in the use of clay retorts in England, and especially in London, after their great advantage had been proved in the North again and again.

In a recent article published in the JOURNAL OF GAS LIGHTING, contributed by our esteemed Secretary, the writer states that one cannot but express surprise, on looking for data on such topics as the effect of length of retort on the quantity or quality of the gas produced, the influence exerted by the weight of the charge, the sectional area or thickness of the retort, &c., to find that none are forthcoming, although coal has been carbonized in great quantities for many years. It seems to be generally taken for granted that all we have to do is to get it into the retorts, and to work it off dead. A general, but nevertheless vague, opinion in favour of high heats and short periods of charging, based upon the results of practical experience, together with the obvious deduction that the charge should not remain in the retort after it has been burned off, represents the sum of our knowledge on the important subject of carbonization. Murdoch is said to have experimented with retorts of various forms; but with what results I have been unable to ascertain.

There have been several departures made from the orthodox and stereotyped methods of carbonizing, which seem to have attempted more or less successfully to permanently volatilize the hydrocarbons usually condensed in the tar. Malam, at Dumfries, twenty years ago, succeeded in adding upwards of 3000 cubic feet per ton to his make. The method was also extended to other works; and it failed only because he was unable to continuously remove the pitch. Mr. Isaac Carr, with the Dinsmore process at Widnes, seems to have been more successful; producing over 10,000 cubic feet of 19-candle gas from coal little better than common slack. All such investigations merit our warmest approval and admiration. Strange to say, they seldom receive even courteous criticism. There have always been wiseacres who, lacking the courage and application to strike out a new course or method, nevertheless are ever-ready to criticise and discourage the works of others. Some of our greatest achievements are accomplished facts only because they fall into the hands of energetic and capable men. No greater misfortune could befall any probable improvement than that it should depend for its exemplification upon men who, otherwise capable, yet lack that devoted application, courage, and capacity to work and overcome detail that are so essential to success.

The attention now being given to inclined retorts in various parts of the country, cannot fail in the end to be productive of good. The idea of elevating the coal, and, by a series of gravitating movements bringing it to the ground again *as coke*, is excellent. The system is now in the hands of capable men, who may be depended upon to carry it through to a successful issue. Every additional trial of these retorts commences with the advantages gained from the experience of preceding installations. If various objections which have been raised against this system, and which are principally of a structural nature, can be overcome, I can see no reason why, in works that are adapted to it, it should not be economical and successful.

Mechanical stoking is undoubtedly making steady progress in the country. I need only refer to the published results obtained by Mr. Tysoe at the East Greenwich works of the South Metropolitan Gas Company, where, with West's power machines, coal is being carbonized at a cost of under 1s. per ton, including maintenance and repair. This is undoubtedly the best authenticated result hitherto obtained. Mr. Tysoe says, in a paper read before the Southern Association last year: "The case for machine stoking is not completed with a statement of the amount of reduction in the carbonizing wages. The subject of stopped pipes is always one of interest to gas managers; and a suggestion for the prevention of the evil is

always eagerly investigated by those who are troubled with the complaint. The primary cause of stopped pipes is irregular or insufficient charging, together with irregular heating. If the middle of a through retort is at a proper temperature, and a due proportion is not deposited there, a stopped pipe is the almost inevitable result; or, if a smaller charge than the retort is capable of dealing with is put in, a like result may be anticipated. Both these conditions are easy of attainment under the hand system of charging; it being impossible to exercise supervision over each charge, and the men being anxious to get their allotted task over as quickly as possible, it is frequently performed in a slovenly manner. With the introduction of machinery, an entirely new state of things obtains. It becomes as easy to put in a full charge as a light one, and the driver cannot turn the scoop until it is right home in the retort; and thus a proper charge is guaranteed. The effect of this has been to greatly diminish the number of stopped pipes, and must be placed to the credit of machine stoking. In addition, greater regularity in the illuminating power is maintained. . . . . Another point is gained by having the retorts open a much shorter time than is usual with hand work, which has an undoubted effect upon the yield of gas." Any mention of mechanical stoking that omitted to include the name of Mr. John West would be most incomplete; and I have no hesitation in saying that the general adoption and success of these machines is due to his indomitable energy and dogged determination, equally as much as to his inventive genius and mechanical skill.

There have also been great improvements in the methods of retort setting and heating. The application of regenerative furnaces introduced into this country some time ago, has not made that progress which was anticipated; and why this should be, it is somewhat difficult to determine. The system or principle is theoretically perfect; and the theory has been abundantly illustrated and proved in almost every part of the country. It is absolutely impossible by direct firing to consume coke in anything like a perfect manner. In ordinary work, two or three times the necessary quantity of air to completely oxidize the fuel is passed into the furnace. This three-fold quantity of air, with its enormous preponderance of diluent nitrogen, not only carries off a large amount of heat to the chimney stack, but it acts as an envelope of inert gas, preventing the proper oxidization of the fuel.

I do not contend that, by burning 12 parts by weight of carbon (C)—of the coke—with 16 of oxygen into 28 of carbonic oxide (CO), and afterwards burning this carbonic oxide with another 16 of oxygen, to form 44 of carbonic acid (CO_2), greater heat would be produced than if 12 of carbon were burned with 32 of oxygen direct to form the 44 of carbonic acid. But it is held that higher results would be obtained in the former case; because it would be accomplished with a minimum quantity of air and, of course, diluent nitrogen—just sufficient air being introduced to completely oxidize the carbon of the fuel. Again, with direct firing the products of combustion must of necessity leave the setting at the temperature of the retorts; while, on the other hand regeneration recovers and restores a considerable portion of the heat thus lost. No better example of this fact need be quoted than that we have this day witnessed in the retort-house of the Bournemouth Gas-Works. The chimney-stacks were, as you would notice, made of wrought iron, 18 inches diameter; the bottom end resting on the setting, and the upper end passing just through the roof, and yet so little heat escapes from the generators employed, that these stacks are not red, even when seen at night.

By regeneration is not meant long and tortuous flues, because experience proves that these are unnecessary. The actual saving by the use of regenerative furnaces is from 10 to 30 per cent., compared with direct firing. The actual consumption of coke per 100 lbs. of coal carbonized must vary in accordance with the quality of the fuel used. With coke containing from 15 to 25 per cent. of ash—such as is sometimes met with in this district—it would be impossible to obtain the low results said to be secured in some works; still the proportionate saving will be the same whatever the class of fuel. There are, in addition, other marked advantages—the facility with which a properly constructed furnace can be cleaned, less wear and tear, and more uniform and regular heats, &c. Yet, with all these advantages in favour of gaseous, or regenerative furnaces, advantages that have been confirmed in my own experience, these furnaces do not, in my opinion, receive the favour their merits warrant.

To obtain anything like a full measure of success with regenerators, there are a few essential points to be kept in view: First, the primary and secondary air should be kept under complete control. Second, the furnace gas and air should be well distributed throughout the setting; so as to secure, as far as possible, continuous combustion. Third, the furnace should be easy of access for cleaning, and worked regularly. Fourth, intelligent supervision is required. The exit-flue from the setting should be convenient for inspection; and a little experience will enable any intelligent foreman or furnaceman to regulate the primary and secondary air so as to exactly balance; and the heat of the retorts themselves will at once show if there is any excess or insufficiency of furnace gas being produced, equally as well as, if not better than, any chemical analysis. In some of our large works, water-gas plant has recently been introduced—not so much on economical grounds, as of labour considerations. It is stated that a million cubic feet of 24-candle gas can be produced per day with five men per shift, and at a cost of 1s. 6d. per 1000 cubic feet. Mr. A. G. Glasgow, who has had considerable experience in the manufacture of water gas in America and in this country, gives the following as the actual results obtained, I believe, at Beckton, with Lowe's improved plant:—

40 lbs. of coke, at 15s. per ton	3½d.
3¼ lbs. of oil	11½
Labour	1½
Purification material	½
Repairs and maintenance	½
Superintendence	½
Total holder cost	1s. 6d.

The facility with which large quantities of rich gas can thus be produced, cannot fail to be of great advantage, especially in large works. Another advantage is that the apparatus can in a few hours be put into full working order; and gas of any desired quality, from 16 to 40 candles, can be produced. Oil has also been used with some success, as a substitute for cannel; and there is Mr. Clark's process for the enrichment of gas in bulk, which will come before you to-day for discussion; and which, I am pleased to add, is becoming extensively adopted in some of our largest works.

Following the order of manufacture, the next thing to be considered is condensation. In the term "condensation," is included the treatment the gas receives in its course from the hydraulic main to the commencement of the apparatus for the removal of ammonia and other impurities. The proper degree of temperature to which gas should be reduced before entering the ammonia apparatus, has never been determined with anything like accuracy—every one following the bent of his inclination or circumstances. It is not a matter of congratulation that a subject of so much importance should be left to rule-of-thumb, or no rule at all. In many cases, and in important works, it is thought sufficient to provide apparatus of ample capacity; and then condensation is left, through all the varying atmospheric conditions of our varying climate, to take care of itself. Newbigging, Bowditch, Young, and others have made investigations upon this subject; and two or three general conclusions have been arrived at—first, that condensation should be gradual; second, that it should not be excessive; and, thirdly, that the gas and tar should not be allowed to travel together at temperatures below 100° or 120°. All atmospheric condensers are, to a large extent, at the mercy of the atmosphere; and for efficient and controllable condensation water condensers are to be preferred. The annular condenser at first found considerable favour; and now large foul mains running round the inside of the retort-house, with an inclination to the hydraulic main, are advocated, and are being introduced with advantage into several works in the south-west district. This is one of the subjects which undoubtedly call for accurate investigation by gas engineers.

Where high heats are employed, great difficulty is often experienced in keeping ascension pipes and hydraulic mains clear. This may be due to too much or too little condensation in that part of the plant; generally it will be found due to the tar being practically distilled, and the pitch deposited in the pipes and hydraulic mains. Taking off the tar, &c., from the underside, and regularly flushing and filling the hydraulic main with warm liquor, together with regular and even charges in the retorts, will generally be found to give relief, if it does not entirely remove the difficulty. With reference to the after-condensation, my own plan has been to have thermometers fixed at the inlet and outlet of condensers, scrubbers, washers, and purifiers, which are all daily observed and recorded; and, as far as practicable, the gas is never allowed to fall below 55° or 60° Fahr.

After the condensation is accomplished, there remains the ammonia, sulphuretted hydrogen, and other sulphur compounds, and carbonic acid. The purification of gas has made undoubted progress of late years, and is now carried out with a scientific refinement unknown to any previous period. Yet our methods of accomplishing this purification, cannot be considered anything but clumsy and extravagant. The preparation of the material, the filling, covering up, securing, and after a time again uncovering and digging out the material from the purifying vessel is most unsatisfactory, and must sooner or later give place to some continuous and less laborious methods. The actual results obtained by our best methods of dry purification leave little room for complaint; as the purity of the gas supplied at most works is in every way satisfactory.

The cost of purification in the Metropolitan works is given by Field as 9·8d.; the Suburban Companies, at 7·13d.; Provincial Corporations, 4·69d.; and Provincial Companies, 7·13d. per ton of coals carbonized. So that the companies spend over 50 per cent. more than the corporations in the matter of purification, which shows that the private companies, at least, spare no cost in this respect.

The great ideal of gas engineers has for many years past been a continuous system of purification in closed vessels, wherein the sulphur compounds and carbonic acid will be removed with the same ease, and, let us hope, with the same amount of profit with which ammonia is now removed.

Attempts have been made as far back as 1860 to use the ammoniacal liquor obtained for arresting the other impurities. The first contribution of Mr. George Livesey to the British Association of Gas Managers was upon this very subject, and will be found in the first volume of the "Transactions" of 1866. Laming and Hill have also made experiments in the same direction; but the most recent, and, I may add, the most hopeful experiment in this direction is that known as Claus's ammonia process. This may be simply described as a method of arresting the carbonic acid with ammonia, forming the carbonate, and the sulphur as sulphide of ammonia, &c.; and then, by a series of tower scrubbers, decarbonating and desulphurating the ammonia, or, as it may be expressed, revivifying it to be used over again—as it is well known we have only about one-sixth the theoretical quantity of ammonia necessary for arresting these impurities. The great beauty and advantage of the process is that the impurities can all be recovered in a marketable form, The surplus ammonia, being perfectly pure, can be used for making any of the salts of ammonia.

The amount of sulphur contained in gas made from west-country coal will average about 14·08 lbs. per ton of coal. The proportion due to sulphuretted hydrogen is 13·79 lbs., and that to the other sulphur compounds 0·29 lb. per ton of coal. These impurities can be removed in dry purifiers at a nominal cost; and in one works with which I am acquainted, the sulphur is removed and the carbon disulphide, &c., kept at an average of 10·71 grains per 100 cubic feet, with oxide alone, at a cost of under 1d. per ton, and if the oxygen or air process were in use, I have no doubt this cost would be considerably reduced. The removal of carbonic acid, which averages 3¼ per cent., in the same works costs over 4d. per ton of coal carbonized, and theoretically requires 3·94 cubic yards of lime for this purpose. Practically over 15 per cent. more than this quantity is used. To obtain the full duty of the ammonia produced in ordinary working, in the removal of sulphur and carbonic acid, it is necessary that the gas be kept in intimate and prolonged contact with the liquor; and the success of some of the washer-scrubbers recently introduced, is due to the fact that the liquor is retained in the apparatus for a considerable time, and thus becomes thoroughly saturated with these impurities.

With regard to the working up of residual products, the circumstances and surroundings of each particular works must decide. Where 1s. 8d. or 1s. 9d. per ton is being derived from ammoniacal liquor at the present time, it would obviously be unwise to manufacture sulphate or any of the other salts of ammonia. The manner in which some of our medium-sized undertakings, and even small works in our own district, work up their residuals affords striking evidence of the energy and technical knowledge being brought into play in modern gas manufacture. In our best conducted establishments, coke is carefully and scientifically employed, tar is distilled for its various products, limestone is burned, and oxide of iron manufactured on the premises. The sulphur recovered in the process of purification is converted into sulphuric acid, the ammonia obtained is distilled, and together with the sulphuric acid is converted into sulphate of ammonia; and, in addition to this, in a works not a hundred miles from Swindon, patent fuel briquettes are made.

After the gas is manufactured, its careful and successful distribution is a further tax upon the energy of gas managers; and it is in this department where their tact and business capacity will be put to the most severe strain. In addition to the great vigilance and care necessary in the laying and maintenance of mains and services, experience has shown that too much attention cannot be given to consumers' meters, service-pipes, and the public lamps. With regard to meters, there is undoubtedly, on the part of the consumer, a preference for the dry meter, which, even when new, should never be fixed without testing, and no meter should run more than five years, without being thoroughly examined and tested. When testing for capacity, the test for soundness should never in any case be omitted. The governors and burners of street lamps should also be periodically tested and regulated to the pressure and consumption pertaining to the district. The ignorance of the general public with regard to the proper method of burning coal gas, and the unfortunate state of many consumers' pipes and fittings, have naturally raised the question as to the desirability of controlling the consumers' gas supply. Excessive pressure, small and badly laid pipes, and defective burners are unfortunately far too prevalent, and these all find expression in the complaints of the consumer as "bad gas."

Mr. Keillor recently called the attention of the North British Association of Gas Managers to the important position the meter inspector occupies, as being the representative of the company most in contact with the consumer; and he suggested, as a fifth "golden rule," that "the inspector should be a man of sound mind and judgment, thoroughly learned in the distribution of gas, and able to discuss, with consumers on the spot, everything connected with gas supply." And considering the recent development of cooking by gas, and the general adoption of gas-engines, I would suggest that he should also be trained in the rudimentary laws of combustion, ventilation, and mechanics, and that his pay should be in proportion to the standard thus adopted.

It is satisfactory to note the general activity that now pervades the gas industry. There never was a time when those engaged in the manufacture of coal gas were more alive to everything pertaining to improvement and economy; and I think it may be fairly claimed, that the various Associations have played a most important part in bringing about this condition. They have not only helped to carry forward the profession "in a line with the general progress around us," but have generally given the lead in every new advance. There is, however, one point upon which the Associations, and particularly the National Institute, seem to have failed in their duty—namely, in promoting technical education, by forming a Board of Examination for the purpose of examining students. Can it be considered creditable to a wealthy and influential industry that it should leave the examination of its rising young men to irresponsible outsiders like the City and Guilds of London Institute? If these examinations were under the auspices of the profession, by whom the Board would be elected, they would be more generally supported and valued. I would not like to be understood as saying one word to detract from the value of these examinations, or in the slightest degree to reflect upon those who conduct them. The examination stands alone as the best in existence, and, as such, commands some respect and gratitude from all interested in technical education. The JOURNAL OF GAS LIGHTING, which has always warmly supported the formation of an Examining Board, says: "We are desirous of aiding by this means the intelligent study of the principles of gas manufacture and distribution, so that the rising generation—the gas managers and engineers of the future—might rid themselves of the pernicious influence of routine, and, shaking off localisms and cramping traditions, might equip themselves with a stock of sound technical information." The fear that has been expressed in certain quarters that, because technical (or, as I should prefer to call it, exact) knowledge was encouraged, there was danger of ignoring energy, practical knowledge, and sound judgment, is absolutely groundless. Experience, judgment, and energy are qualities which it would be impossible to ignore in any walk of life; and they are absolutely necessary in this as in other professions.

In conclusion, gentlemen, there is just one matter to which I desire to call your special attention. We have now some nine District Associations, and two other Societies which aspire to national representation, all doing good and useful work, and yet having no connecting link or means of combination for the purposes of research, or for organizing the combined influence and opinion of those engaged in this great industry. There is a wide field of investigation yet lying fallow. There are problems unsolved in carbonizing, purifying, and distribution; and the industry is entering upon a phase of its existence to which it has hitherto been a stranger. For years we have rested secure in the monopoly guaranteed by Parliament, satisfied and contented if but our standard dividends were paid. But now other competitors are in the field, backed by wealth and science; and the race will be determined, to a very great extent, by the respective cost and efficiency of the competitors. Would it not be a great advantage in this competition if the various isolated Associations were federated into one grand Institute or Institution, having sectional divisions or district branches? The objects of each Association are the same; and are set forth by each one in almost identical language—namely, to promote the advancement of the industry in its various branches of "engineering, manufacture, and finance;" and the only difficulty that stands in the way of such a consummation, as far as I can ascertain after inquiry, is the nominal position to be occupied by certain gentlemen, whose honour, attainments, and experience are not questioned, but whose connections with trading concerns are considered to debar them, not from associating with (because that is accorded by every one of the societies without exception), but from certain privileges pertaining to membership. If this is the only difficulty existing to prevent the reunion of the Associations, and passing over certain very regrettable personalities that have taken place (which I am sure every gentleman will do), then, in the name of loyalty to the industry to which we are all bound, in the name of business and of common sense, let there be some *via media* agreed upon, so that we can, in unity and brotherhood, devote ourselves—not to the elevation of this or that section, not to the personal advancement of any clique or party, but, instead, to the furtherance, by contribution, exchange of experience, investigation, and research, of all that pertains to the true success of the gas industry.

Mr. DURKIN said a very pleasing duty had fallen to his lot; and it was to propose a vote of thanks to the President for the address to which they had listened with considerable interest. It was an address full of thought, and would bear reading at their leisure. He was sure they did no wrong when they chose Mr. Irving to be their President for this year; and they were all very much indebted to him for obtaining the services of Mr. Richardson to read a paper on the Severn Tunnel at the Bristol meeting. It was a most instructive contribution to their proceedings.

Mr. H. TOWNSEND (Plymouth) seconded the motion. Being a very young member, he had listened to Mr. Irving's address with very great interest; and he had been especially struck with that gentleman's conduct in the chair—he was, indeed, quite an ideal President.

The motion was unanimously carried.

Election of Office-Bearers.

The Scrutineers then reported that the following gentlemen had been elected office-bearers:—

President—Mr. E. C. Riley, of Swindon.
Vice-President—Mr. Norton H. Humphrys, of Salisbury.
Secretary and Treasurer—Mr. Norton H. Humphrys.
Auditor—Mr. W. Higgs, of Basingstoke.
Members of Committee—Mr. W. J. Fuller, of Bournemouth; and Mr. H. Townsend, of Plymouth.

Mr. Riley thanked the members for their mark of confidence in electing him—such a young member as he was—for the important position of President. He never anticipated, when joining the Association only a few years ago, being so soon thus highly honoured; and he should do his best to make the meetings during his term of office as profitable and useful as possible to the members.

Place of Next Meeting.

The President said that it was usual for the Association to visit the town at which the President for the time being resided; but Mr. Riley was a cosmopolitan—he was connected with several towns. The Committee had therefore been unable to decide whether to hold the spring meeting in London or at Swindon; and so had left the question for the members to settle.

Mr. Riley said he might point out, for the guidance of the members, that his works at Swindon were larger than those in London. So far as he knew, however, they manufactured at the Wormwood Scrubs works a greater quantity of oil gas than the other London Companies. The week before last, they turned out 231,000 feet of oil gas. Perhaps the members would better grasp these figures if he mentioned that they would represent from 900,000 to 1,000,000 cubic feet of coal gas. It was probable they would have oil-gas works in operation at Swindon by next March.

Mr. W. A. Padfield (Exeter) moved, and Mr. James Lowe (Weymouth) seconded, that the meeting be held at Swindon.

Mr. F. G. Dexter (Winchester) observed that he thought London would be very interesting to the members, bearing in mind that they had only recently visited Swindon; and though that was a place which was rapidly improving, the Wormwood Scrubs works were almost perfection, and one of the finest systems of oil-gas making was to be seen there. As an amendment, he would propose that the meeting be held in London.

Mr. W. Davis (Poole) seconded the amendment, which, on being put to the vote, was carried by eleven votes to seven.

The Development of Gas Lighting in Trains; and the Enrichment of Gas in Bulk by Carburettors.

The adjourned discussion on the two papers on the above subjects read respectively by Mr. E. C. Riley and Mr. Frank W. Clark, at the meeting at Bristol in April last, was then taken.*

Mr. Durkin said their thanks were due to Mr. Riley for his paper on the development of railway carriage lighting, as it brought the subject up to date. They were much indebted to those who had given this branch of gas lighting so much attention, and had added to the comfort of railway travellers by the abandonment of oil-lamps, which rendered reading in trains next to impossible. It was to be regretted, however, that, in the compression of coal gas, so much of its illuminating value was lost—especially after the assurance which an expert on the subject had given at a meeting of gas engineers that it was not so, and who at the same time submitted a flame produced by compressed coal gas to show its value for the purpose of railway train lighting. With regard to the new lamp which Mr. Riley exhibited at the Bristol meeting, he (the speaker) had since had an opportunity of travelling on the Great Western line, and seeing one of the lamps in operation. It was a great improvement; and he thought they would have little to complain of if this kind of lamp was generally adopted. What he did complain of where gas was used (he was not now speaking of the Great Western Railway), was that they did not give the passengers enough of it. On one line he had to travel upon sometimes, the consumption was only from ½ to ¾ cubic foot per hour, which certainly lighted the compartment, but not sufficiently for reading. He did not think he could say anything on the subject of the paper read by Mr. Clark. The gas generally manufactured in that part of the country did not require very much bringing up to the standard. He had no doubt that the system described by Mr. Clark was a very excellent one; but, of course, it was entirely a question of pounds, shillings, and pence. The statistics given in the paper would be very useful as a guide to those who felt inclined to go into the matter in a practical manner.

Mr. Norton H. Humphrys said the subject of railway lighting, as Mr. Durkin had very properly remarked, was one which greatly interested all who were concerned in travelling. He thought it went a little further than that. There was a saying that, when an actor wanted a holiday, he would go to another theatre; and so they, who were accustomed to make gas from coal, could, with great advantage, study these processes for making gas from oil. In coming to the meeting, he read a description of the oil-gas works at Holloway in the Transactions of the Institution of Civil Engineers; and it was evident that this method of making gas was becoming one of the things of the day, and would become permanent. Apart from that, they had not only the question of oil gas as a separate thing for lighting railway carriages, but Mr. Clark had shown them one way in which hydrocarbons might be applied for assisting coal gas. With regard to Mr. Riley's paper, he thought the chief portion of it was the description of the lamp which he had adopted, and which was a great improvement on the old-fashioned oil-lamp. From fig. 4 in the paper, he took it that it was in some sense a kind of regenerative lamp, and that it was supplied with air which was heated by the products of combustion as they passed up through the middle. He should like to be informed by Mr. Riley whether this regenerative system was found to be capable of improving the duty or illuminating power obtained per foot of gas. The author had given them some tests of the quantity of light developed from the different burners; and he should like to know whether, with the new lamp, he had succeeded in improving the illuminating power. In the tables they had some interesting information as to the compression of coal gas. He took it that the three samples on March 14 were one and the same; but they found a considerable variation in the amount of depreciation suffered by compression. The percentage of loss on compression ranged from 33 per cent. up to 41 per cent. In the next set of figures. the loss was considerably less—only 19 per cent. up to 27 per cent., and then, again, they had a less amount still. There was evidently considerable variation; and there was something that required a little more explanation before they could form any idea of what was the amount of depreciation which might be expected by compressing gas. From the experiments that had been tried, there was no doubt that certain of the illuminating constituents were thrown down by the compression. Such constituents as ethylene, for instance, were permanent gases, and would stand a considerable amount of compression without going down. With regard to Mr. Clark's paper, he concluded it by giving eight reasons in favour of the carburetting process described. He noticed that these reasons were such as to call for more careful attention in these times when gas men were working under very great pressure to turn out a gas of good quality at a fair price. The reasons alluded to, he (Mr. Humphrys) seemed to think, pointed rather in a direction that had been very much practised in New York—of making a cheap, inferior gas, and then bringing it up to the necessary standard by carburetting it. He believed that in one of the New York gas-works, they produced about 14,000 cubic feet of gas per ton of coal, and then carburetted it. Mr. Clark's process appeared to move in the direction of making a gas that would satisfy consumers so far as illuminating power was concerned, and at the same time be cheaper, for working expenses, than any other gas. But it seemed to him (Mr. Humphrys) that the gas might be very suitable for large towns; but he rather questioned how it would answer for small places, where they threw out mains which were called "spiders' legs." In some cases, they might have a mile of main, and only half-a-dozen consumers at the end of it and two or three public lamps on the road. To supply carburetted gas under these circumstances would be rather a heavier test than it had been put to in those quoted in the paper. There was a large consumption of gas in London; and the motion in the mains was much quicker than in the case of mains in country districts. The point he would raise would therefore be, whether the carburetted gas would stand the slow motion that it would get in a country district, where it would remain some hours and perhaps in certain cases days in the pipes.

Mr. F. G. Dexter (Winchester) said that, in view of the remarks made by Mr. Durkin, some explanation from him might be of service in settling the question, as he (the speaker) had been closely associated with the trials and experiments both with Mr. Botley some years ago and subsequently with Mr. Riley. The remarkably rich Argand flame to which Mr. Durkin referred, as having been exhibited to disprove the assertion that coal gas suffered in illuminating power by compression, was due to an unfortunate error in preparing the sample. At that time oil-gas plant was alone available for experiments with coal gas, and one of the cylinders containing oil gas was emptied to a zero gauge, and then charged with coal gas. Of course, the oil-gas cylinder still contained its own volume of rich oil gas at atmospheric pressure, and that, of course, diffused with, and enriched the coal gas subsequently pumped in—thus vitiating the sample drawn off to supply the light in question. There was no doubt the coal gas suffered to a great extent by compression, and in a higher ratio than oil gas, calculating on the basis of their respective illuminating powers, although at the same time the experiments on the compression of coal gas tended to make the loss heavier than it might or should be for reasons which he would explain. Speaking generally, the loss on compression of 50-candle power oil gas was 10 per cent.; of 16-candle coal gas, 36 per cent.; of 15-candle coal gas, 42 per cent. But, it was to be borne in mind that the oil gas suffered compression to the extent of 150 lbs. only; whereas the coal gas was compressed up to 200 lbs. per square inch. This pressure in the case of coal gas was necessary in order to store a sufficient quantity in the

* See Journal, Vol LIX., pp. 749, 751.

smaller plant adapted for oil-gas distribution. Had the question been gone into thoroughly, with plant of proper capacity, (and, in particular, pumps suitable for dealing with the larger quantity of coal gas, without so much unnecessary churning), there was no doubt that the percentage lost on the compression of coal gas would have been less heavy, though the ratio of the loss in the case of coal gas must, of course, be higher than was the case with oil gas. It appeared to him that there was a certain quantity of heavy hydrocarbons of some definite series which were particularly susceptible to the pressures recorded; and as the proportion of light-giving hydrocarbons present in oil gas would be considerably greater than those in coal gas (in relation to the complement of non-illuminating or diluent gases), it would necessarily follow that, on those hydrocarbons being removed, the resultant decrease in the illuminating power would be at a continually increasing ratio the poorer the initial quality of the gas. The tests given in Mr. Riley's paper were made quite recently; and he (Mr. Dexter) not having before seen them, perhaps it was for that reason he could not reconcile some of the figures there given. He would like to ask to what the temperatures in the fifth column referred. He noticed the readings varied from 60° to 70° Fahr. on three different days. Was this the temperature of the non-compressed gas on March 14, or the compressed samples of the 16th, 18th, or 21st? and in either case, had the necessary corrections in the illuminating values given been made for this? Again he would like to know if the readings had been corrected for the barometrical influence for each of the days specified? The heading of the last column (percentage of loss on compression) appeared to him inaccurate; and this was the cause of Mr. Humphrys being misled in his remarks. The words used should, of course, indicate the quality of the gas when first compressed (150 lbs.); whereas the percentages referred to the illuminating power of the gas at the time of actual testing, when the pressure had designedly been allowed to vary from 132 down to 5 lbs. only. Mr. Riley had himself pointed out that, when the pressure had been released to these lower limits, some of the hydrocarbons at first thrown down would partially evaporate and enrich the gas remaining in the holder, although this reaction was not regular enough to be of much practical service. With regard to the general question of coal gas *v.* oil gas for railway carriage lighting, he (Mr. Dexter) would like to point out that, in his opinion, there was not much value in Mr. Riley's contention that one of the fatal objections to the use of coal gas was its low illuminating power, and the consequent increase storeage capacity necessary, for this reason: The original consumption of the oil-gas lights was given at ½ to ¾ cubic foot per hour. But, as a matter of fact, the consumption varied between ¾ and 1 cubic foot; and now that oil gas had been taken up to a considerable extent, they found no difficulty in finding storeage for a consumption of 2½ feet per hour with the triple burners. Then seeing that 3 cubic feet per hour of coal gas was the original consumption in regenerative lamps fixed in an experimental coach running on the underground railway at the time Mr. Botley had charge of the works, and the lighting effect obtained then was quite as good as any subsequent result with oil gas, he was of opinion that the objection on the score of storeage capacity could have been easily disposed of, with a little more enthusiasm and determination to succeed. He was aware that the Clark regenerative lamps burning coal gas were experimented upon for some time in a train running between Weymouth and Swindon; but he felt bound to record the fact that the want of success in that case was entirely due to the amount of manipulation and alteration of one kind and another that the system received at the hands of several railway officials, instead of the defects being left to the consideration and attention of the one person best qualified to remove them —the inventor. He (Mr. Dexter) thought that it was a very great pity that the system of enriching coal gas by carburine, as described by Mr. Clark in his present paper, had not been brought forward a little earlier. If any difficulty had been apprehended of obtaining coal gas of uniform quality at separate gasing stations along the line, the quality of any town's gas might have been augmented by some such arrangement as this; and the difficulty thus readily surmounted. He would like to ask Mr. Riley further, whether any systematic attempts had been made to effect the construction of a proper regenerative oil-gas lamp, as he had no doubt by this means the duty could be very greatly increased, and the consumption correspondingly reduced. He was surprised at the trouble taken to elaborate either duplex or triple burners. The table of their efficiency clearly indicated the loss in duty resulting from the splitting up of the consumption in this way, and was a fallacy long since exposed. [Mr. Dexter then commenced to make some remarks upon Mr. Clark's paper, but was asked by the President to allow Mr. Riley to reply at once, as he was compelled to leave the meeting in order to catch a train.]

Mr. RILEY said with respect to Mr. Humphrys' reference to the improvement of the illuminating power by regeneration, of course the tests mentioned were made with a naked light on a bar photometer; and the light had not the assistance of the heated air that it would get when in position in the lamp. He had no doubt himself that the regenerative principle of heating the air did assist the light; but he had no test to give the meeting to verify that fact, and so he had not made any allusion to it. With respect to the particular kind of lamp referred to, it was not only the regenerative principle that it was desired to combine in it, but also the principle of ventilating the carriage at the same time, while taking its supply of air from the inside. They had now tried, on an experimental scale, another lamp in which they had the ventilating principle; and this lamp worked more actively for that purpose than the one to which he had been referring, and would change the air of the compartment in a very rapid manner. The temperature at the time of the tests was simply the temperature of the gas when being tested in the photometer-room, corrected in the ordinary way for barometrical pressure. Then, as to the percentage amount of compression, he thought there was a good deal to be said on that point; and perhaps if Mr. Dexter would give him a list of the questions (as time would not permit of an answer then), he would have a full reply prepared in time for publication with the discussion. With reference to the question as to coal gas not being successful, he was not quite sure that the last had been done with respect to it. Many railway engineers and managers—having regard to the important feature of storeage, where they desired the lightest possible weight added to the carriages, and the least possible addition made to the amount of gearing or vessels carried underneath, especially where the carriages were fitted with vacuum brakes—attached great importance to reducing the storeage capacity to the smallest limit. They were now dealing with a large third-class carriage with eight compartments, travelling from London to Milford. They had a little difficulty in getting that home with a supply of gas at a pressure of 130 lbs.; and the Carriage Superintendent was anxious, on his part, not to add to the storeage reservoirs at all. He (Mr. Riley) was bound to say, however, with regard to coal gas, that his conviction was that it might be advantageously used to a considerable extent on small and short lines. It was being employed uncompressed on the North London Railway for short distances; and where there were facilities for getting coal gas at a low price, and in a convenient manner, he thought they might see some further developments in the way of using it for railway carriage lighting. As to the consumption of gas in the regenerative lamp to which Mr. Dexter had alluded, in one part of his paper he said: "Several railways that have experimented to some considerable extent with the electric light, but have now adopted gas lighting, are in consequence using larger and better lamps and burners; the consumption per burner being nearer 1 cubic foot than the ½ foot previously used. It was also found that, owing to the usually dark nature of the upholstering of the first-class carriages, the same lamp which gave a good reading light in the plainer and more slightly upholstered second and third class was insufficient in the first. This led to two lamps being placed in each compartment, one on each side; and then to the adoption of duplex and even triple burners, burning 1½ and 2¼ cubic feet respectively." The ½ foot was for a single flame; and in the large lamps—the duplex—the consumption was on the average 1½ or 1¼ cubic feet.

Mr. F. W. CLARK observed that six years ago he took a carriage of four compartments up to Aberdeen, and back as far as York, with coal gas enriched up to 21 candles. The gas was compressed into two cylinders, placed on the top of the carriage. This experiment was carried out on behalf of The Gaslight and Coke Company; and it showed that it was quite possible to light a train on a long journey with coal gas.

The PRESIDENT said he was sure the members were very much indebted to Mr. Riley for his paper, which he regarded as a valuable contribution to their transactions. They were all more or less interested in railway travelling; and the information contained in the paper had not only brought the history of what had been done up to date, but they had two illustrations of lamps showing very great achievements in the way of ventilation and good combustion under most trying and severe circumstances. Nothing could be more severe than the tests to which these lamps were put; and he only regretted that greater attention had not been given to the economical and successful burning of gas for ordinary purposes. They must remember that the manufacture and compression of oil gas was reverting back to what had been done in the early part of the century. They were all much interested and surprised at the great similarity between the new steel cylinders used by Mr. Riley, and those exhibited, at their last meeting, by Mr. Hiram Fiddes, which were said to have been made in Bristol about 1824, and in which oil gas was compressed and conveyed to the consumers. They would thus see that manufacturing and burning oil gas was going back to old methods. However, the question all hinged upon the matter of cost—if the oil could only be bought cheap, oil gas could be easily made, and no doubt it could also be used for the enrichment of water or coal gas; and he thought Mr. Clark had a process that was capable of doing this. The only difficulties he could see with regard to the enrichment of coal gas with gasoline or oil gas were: First, the permanency of the enrichment added to the gas. It was absolutely necessary it should be permanent. Perhaps the instance that Mr. Humphrys had given was exceptional; but at any rate it should be sufficiently permanent to stand a test on the lines mentioned. In the second place, they should be assured, to some extent at least, of the supply of oil. The advantages that the enrichment of gas offered to

gas-works were, he thought, very many; and the system was now being extensively used. It had been adopted at Bristol and Birmingham; and, if it continued to progress, it would undoubtedly push the expensive cannels out of the market. The very fact that these cannels would no longer be bought would bring down their market value; and he was inclined to think that in the future, they might be able to purchase first-class cannel at the price of common coal. Another thing was the ease with which gas could be enriched 2 or 3 candles (he believed Mr. Clark spoke of 5 or 6 candles, which was practically producing about one-third of the gas required), with comparatively little labour, and at a cost equal to, if not cheaper than, what it was being produced at at the present time. They must also remember that by this means they would reduce the quantity of coke, which would, of course, increase its value. Then there was the great saving of labour and of anxiety to the engineers and managers in charge of large works, where the gas was under the strict supervision of official testers. At times, it was very difficult to maintain the required standard of illuminating power; but, with this process, if the gas was a candle or two below the prescribed power, thay had simply to turn on the gasoline, which could be regulated he believed almost to a nicety. It could scarcely be expected, in the absence of experience, that they could thoroughly discuss Mr. Clark's paper; but they were extremely thankful to him for his contribution and information.

Mr. F. W. Clark (London) said he would not detain the members long in replying to the questions raised upon his paper. In the first place, with regard to the permanency of the gas, the process which he had described had been at work during the past three years at the Bromley works of The Gaslight and Coke Company. The official testing-station where the gas was tested was situated about 8 miles from the works. The gas first travelled through four miles of 48-inch main, and then through 36 and 24 inch the remaining distance. It took eight hours for it to reach the testing-station in the evening; and, at the rate at which it flowed in the daytime, it would take 24 hours. They were now making 13-candle gas, and producing 11,600 cubic feet per ton from common coal without using cannel; and this gas was enriched to the extent of 2 or 3 candles. At the Lupus Street works of the same Company (from which they supplied 21-candle gas), they had not employed cannel for some months. The quality of the gas made there was 15 candles; and they raised it an additional 6 candles with the enricher. At Birmingham, they were fixing up the apparatus on a large scale; and the storeage tanks would contain 60,000 gallons, which would be sufficient for nearly ten days' consumption. The Birmingham Corporation had stopped their cannel contract; and intended using all common coal, purchased at a cheap rate—depending entirely upon the carburine for enriching the gas. The process was used at all the stations of the South Metropolitan Gas Company; the carburine being added in some cases at the outlet and in others at the inlet of the gasholders. The apparatus was also being installed at Liverpool, Belfast, and Manchester; and many of the suburban gas companies had adopted it—among them being the Crystal Palace, Croydon, and Tottenham. The carburine, he believed, was very similar to the light oils from cannel; and experience showed that, where used, there was no deterioration in the quality of the gas as with ordinary coal gas. They also found that less naphthalene was deposited. With regard to the supply of the oil, there could be no question about that. They had large quantities in stock; and could supply any amount of it. Concerning the cost of the process, he calculated that it was about one-half that of enriching by cannel—of course, he referred to Lesmahagow cannel, as some of the Midland cannels were cheap and nasty. To show the facility with which gas could be enriched to any desired power, he mentioned that some of the companies who had adopted the process sent out 14-candle gas in the daytime; and in the evening, they enriched the gas by 2 or more candles, and so were able to meet the demand for higher illuminating power—thus enabling them to compete with the electric light.

Votes of Thanks.

On the motion of the President, seconded by Mr. Durkin, a hearty vote of thanks was passed to the Directors of the Bournemouth Gas and Water Company and to Mr. Fuller for entertaining the members.

Mr. H. Sainsbury (Trowbridge) then proposed a resolution acknowledging the indebtedness of the members to the President for the manner in which he had conducted the affairs of the Association during the past year.

Mr. J. Lowe seconded the motion, which was carried with applause.

The President said he was extremely obliged to the members for their kind vote. He could only say that, after having the honour of the presidency of the Association conferred upon him, his duty was to do his utmost to further its objects; and if anything he had been able to perform had met with their approval, he was amply repaid for the labour or trouble he had been put to.

A similar compliment was then paid to the Secretary and Treasurer; and the proceedings terminated.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

Mr. Gadd's Mechanics.

Sir,—Mr. Gadd seems to have forgotten the main point of my letter of July 14, as evidenced by the following quotation from his communication in this week's Journal: "It now appears that Mr. Milbourne admits my conclusions as to the forces operative in keeping the cups of the different lifts sealed, but he objects that Mr. Cripps had already proved this. Now this may or may not be the case for anything I know, as I have not seen what Mr. Cripps has written on this head But if he has made it quite clear, it does seem strange that Mr. Livesey should publicly ask for a satisfactory solution of the problem." Reference to my former letter will show that I asked no such thing; for I stated that I had, before the Rotherhithe holder was tripled (four or five years ago) without increasing the height of the guide-framing, satisfied myself that uncupping on one side by the tilting of the top lifts could not take place with one or even two lifts free of the guide-framing. Furthermore, Mr. Cripps has also in his book proved the safety of such an arrangement. I was, therefore, somewhat surprised to find Mr. Gadd devoted his reply exclusively to this point; but he promised to deal with the other, and really important, question in another letter. This we have waited for in vain, and have received from him instead a series of involved and bewildering mathematical and other statements and quotations, that are of no manner of use, and that probably very few think it worth while to read with sufficient care to master or dispute.

What we really want, in the first place, is actual and substantial proof, mathematical or other—and the other is preferable—that Sir Benjamin Baker, Mr. Cripps, and other men who have studied the question, are wrong when they say that in large gasholders unsupported by external guide-framing the diagonal stresses on the side sheeting are so serious that to entirely dispense with the framing is out of the question.

If, as I said in effect in my former letter, the stresses caused by wind-pressure, and by snow, are such as to require, in an externally guided holder, the guide-framing now commonly used to transmit those stresses to the ground, how, in the absence of such guide-framing, can those stresses be transmitted unless by the sheeting. Until it is proved either that these stresses may safely be ignored, or that the sheeting of the holder itself is quite sufficient for the work, I dare not adopt or advise the adoption of Mr. Gadd's exceedingly ingenious and clever plan in substitution of external guide-framing for large gasholders, which most certainly are not fit subjects for experiment.

Sept. 16, 1892. George Livesey.

Sir,—If Mr. Gadd has studied Rankine as he affects to have done, he should know that there are two senses in which the term "moment of inertia" is taken—viz., the "geometrical" and the "mechanical"; and that, as applied to beams or cantilevers, the question of weight or mass does not enter into the subject at all. Apparently Mr. Gadd only understands it in one sense; and that, unless weight or mass is considered, the "moment of inertia" cannot apply. Herein lies his mistake; and it is to be hoped that in time he will see his errors, and will express regret for the mud he has thrown simply from superficial knowledge of the subject.

Mr. Gadd's quotations from Rankine and others are altogether inapplicable, and in no degree support the statements he has thought proper to make either now or in the past.

Although I declined "discussion," it is perhaps as well for the sake of the many "intelligent readers who are honestly searching for truth" to give the above hint as to the fallacies with which Mr. Gadd would most unfortunately—although I believe unwittingly—blind them. His subtlety and ingenuity in argument are astonishing; and it is only to be regretted that it is not employed on the side of "truth."

Sept. 15, 1892. R. J. Milbourne.

Anthracene

Sir,—Swift and condign pun shment may be said to have overtaken the writer of "Current Sales of Gas Products" who, in last Tuesday's issue, ventured to pin his faith to the opinion that the depression in the dye-trade was alone responsible for the low price of anthracene, when the price of it began to rise there and then to confound him. It would be curious to know in how far that opinion was inspired by the combined "wisdom" that pervades the Council Chamber of the Chartered Company. But surely, even the most bigoted partisan of the new *régime* inaugurated a decade ago in that *sanctum sanctorum*, will be able to perceive what must be patent alike to buyers and sellers of the article by this time—namely, that the turn of the tide in the price of anthracene is bound to set in as soon as a *modus vivendi* shall have been found to give effect to the suggestion made by Mr. George Livesey, of fixing a minimum price for the sale of it over the next twelvemonth. This, be it remembered, is not a new idea, for it was brought forward by the Tar Distillers' Association more than two years ago; and the failure in carrying it to a successful issue then was due wholly and solely to the shortsighted, "dog-in-the-manger" policy pursued at Horseferry Road.

Sept. 17, 1892. Veritas.

Dealing with the same subject, Mr. Th. Smit, of Amsterdam, writes with respect to Mr. George Livesey's inquiries in last week's Journal, to the effect that what he said in his letter (published on the 6th inst.) that he had heard from one of his friends that the explanation accepted by the Directors of the Society of Chemical Industry at Amsterdam about the low price of tar being due to the operation of the M'Kinley tariff, is as far as his knowledge extends; and he has no personal judgment himself on the subject. He adds that he has written Mr. George Livesey privately in regard to the other portions of his letter.

The Employment of Chemists in Gas-Works.

SIR,—Some engineers will no doubt agree with Mr. Newbigging that it is an advantage to have a good chemist on a gas-works; but the majority will still look upon the chemist with jealousy and suspicion, and will do the tests themselves, in their own rough-and-ready way, rather than have a good man appointed to act as a check on their working.

Unfortunately for this latter class of engineer, the rapid strides of chemistry, and its value as a key to successful gas making, has opened the eyes of the various corporations and boards to the importance of having more information about the working of a gas-works, and the materials they buy, than has hitherto been considered necessary, and has led to the appointment by many of a chemist to make independent tests, and assist the engineer in whatever experiments he may wish to make. This has placed the chemist in anything but an enviable position. He is to check and assist the engineer at one and the same time; and it can hardly be wondered at when a certain amount of friction occurs—stopping a great deal of useful information finding its way to the engineer, and preventing the chemist obtaining for the time any advance either in position or salary. As the value of a good chemist becomes more known, this state of affairs will disappear; and it will then be the chemist's own fault if he does not command a salary equal to that of the engineer.

In the meantime, the more eminent men, broader in their views and with nothing to fear, recognize the fact that the chemist is something more than a mere routine tester, and that his chief value is in research work; and if gas making, under their supervision, continues to make rapid progress, it will in no way endanger the engineer's position to recognize the services of the chemist, but will reflect credit on what are equally valuable and honourable professions.

Sept. 13, 1892. CHEMICUS.

Portuguese Gas Company, Limited.—Under this title, a Company has been registered, with a capital of £3000 in £5 shares, to acquire certain concessions for lighting the town of Villa Real de San Antonio, Portugal, with gas, and also to acquire the land and the necessary appliances for that purpose.

Inauguration of Water-Works at Long Eaton.—For some years past, since the development of Long Eaton, reports have been made by the Medical Officers of Health condemning the water drawn from wells in the town; and this led to a Company being formed to obtain powers to supply Sandiacre, Stapleford, and Long Eaton. The Local Board opposed this application; and they called in Mr. Hodson, C.E., of Loughborough, to advise them on a scheme for procuring a supply for the town direct. Ultimately a site was selected at Stanton Barn, near Melbourne; and a well was sunk. A plentiful supply of water was found; and pumping machinery was erected by Messrs. Tangye, and pipes laid to Long Eaton. The cost of the scheme is placed at £40,000; and the Board have borrowed the money, repayable in 30 years. The inauguration ceremony took place on the 8th inst. when a large party left Long Eaton in brakes, and visited the works. Mr. J. Orchard, J.P., the Chairman of the Local Board, started the first engine; and Mr. T. Smith, the oldest member, the second one. Mr. Hodson then explained the system of pumping; complimenting Messrs. Tangye on the way they had fitted up the machinery. Luncheon was afterwards served in a marquee adjoining, a large number of guests being present. Subsequently the company visited Melbourne, and gave a display of the pressure of the supply; then to Castle Donington; and a prolonged display took place at Long Eaton in the evening.

Falmouth Gas Company.—At the annual meeting of this Company last Wednesday week, the Directors had the pleasure of congratulating the shareholders on the continued prosperity of the concern. The reduction in the price of gas announced in the previous report had, as anticipated, resulted in an increased consumption, and although the Board do not feel justified, in the present unsettled state of the coal market, in further lowering the price, they expressed the hope that they would be able to do so before long. The report mentioned that, by arrangement with Messrs. Fletcher, Russell, and Co., Limited, an exhibition of gas cooking-stoves, fires, &c, had been held, supplemented by a course of lectures on cooking by Miss Rotherham, which proved most interesting to large audiences, and had resulted in several cooking-stoves and fires being fixed. From the divisible profits, an interim dividend at the rate of 10 per cent. per annum was paid in February last; and the Directors now proposed a final dividend at the same rate for the second half of the year, and to place the balance of profit (amounting to £168) to the reserve fund. The Chairman (Mr. R. M. Tweedy), in moving the adoption of the report, said that it was satisfactory to be able to state that they had progressed very well indeed. The increase in the consumption of gas had exceeded more than a million feet, which was what the Directors expected might be the case by reducing the price. The profits were smaller than in the preceding year, partially on account of the additional expense in repairing the works. The purifying plant had cost them about £1000; but they believed they had now the best purifying plant in the county, some excellent improvements having been carried out at the suggestion of their Manager (Mr. J. W. Buckley). The report was unanimously adopted. The Chairman's statement as to the progress of the Company is fully borne out by particulars which have reached us as to the make and sale of gas during the past six years. In the year 1887, the make was at the rate of 10,460 cubic feet per ton of coal carbonized; but the sale was only 8920 cubic feet—the gas unaccounted for being 13·85 per cent. of the production. In 1889 the make per ton was 200 cubic feet higher; and the sale about three times this quantity in advance of the first-named year—the leakage being only 8·73 per cent. In the financial year just closed, the quantity of coal carbonized was 2522 tons 5 cwt.; and the total production of gas was 26,264,800 cubic feet, or at the rate of 10,412 cubic feet per ton, of which 9694 feet were sold. Of the entire make of gas, 24,987,100 cubic feet were accounted for; showing a loss of only 1,277,700 cubic feet, or at the rate of 4·86 per cent. When it is stated that prior to 1889 the minimum leakage was 11·10 per cent., while the maximum was more than 30 per cent., the care bestowed by Mr. Buckley in improving his distributing arrangements will be apparent.

MISCELLANEOUS NEWS.

SHEFFIELD UNITED GASLIGHT COMPANY.

Half-Yearly Meeting.

The Ordinary General Meeting of this Company was held last Tuesday—Sir FREDERICK MAPPIN, Bart., M.P., in the chair.

The notice convening the meeting having been read, the Directors report and the accounts (a summary of which appeared in these columns on the 30th ult.) were taken as read.

The CHAIRMAN, in moving the adoption of the report, first dealt with the position of the capital account. He said that during the past half year they had spent capital to the amount of £9469; and the total now expended was £675,521. On June 30 the amount not called up on shares already issued was £76,589; and that day they proposed to issue shares to the amount of £76,073. Altogether they had £152,662 of share capital to call up before their capital powers were exhausted. They had sold the surplus shares that were not taken up of the last issue, amounting to £5292; and this had enabled them to add £529 to the reserve fund—making it £79,148, which was the maximum amount they were entitled to place to that account. The revenue, as the shareholders were doubtless aware, had not enabled them to earn the full dividend; but this, in the present state of affairs, was not surprising. After adding £529 to the reserve fund, and paying 10 per cent. dividend on all the share capital, there was still a balance to carry forward of £540. The favourable features of the half-year's working were that there had been an increase of £4030 in the sale of gas; meter and stove rents showed an increase of £159; coals had cost £1454 less; and the repairs of works had decreased by £2218. The unfavourable features were that they had received £530 less for coke than in 1891; £446 less for tar; and £1015 less for other residuals. The repairs of mains and service-pipes had been exceptionally large; the Company having spent more upon them during the past six months than in any half year of its existence—viz., £6035, which was an increase of £1502. Rates and taxes had been increased by £948; and the dividends amounted to £1743 more than last year, all of which had to be provided for in the half-year's accounts. The quality of the gas had been maintained in every respect above the standard. In 925 tests the average illuminating power was found to be 15·88 candles; or by the London standard, 17·38 candles. They had carbonized 4422 tons more coal than in 1891, and had paid £1454 less for it, which, in the present state of the coal market, would probably be considered satisfactory. The unaccounted-for gas had amounted to 58,447,000 cubic feet, against 88,033,000 feet in 1891; so that the difference was 30,000,000 feet. He explained at the meeting last year, that it was not at all satisfactory to the Board to find so large a leakage as was then going on; and they were glad to be able to report a marked improvement. The number of meters at work on June 30 was 49,462—an increase of 1128 during the past twelve months. The shareholders were, of course, aware that throughout the country gas manufacturers—whether municipal authorities or private companies—had been raising the price of gas to consumers. The Directors did not like this policy, and would do all in their power to avoid it. They believed in a low price and a good quality of gas. In view of the competition which was before them, this was both their duty and their interest; for everyone knew by experience that, when an article was increased in price, the consumption, as a rule, diminished. It was his firm conviction that gas companies, instead of raising their prices, should exercise a little more business capacity in purchasing their coals and in disposing of their residual products. The depreciation in the price of residuals was the most serious difficulty to be contended with. There was no fear of the sales of gas falling off, they appeared to be universally maintained; but the receipts for tar and other residuals showed of late years an enormous reduction. In 1872, anthracene came into use as a substitute for madder, to produce alizarine dye, and the price of it at that time was 4s. 6d. per unit—equal to £150 per ton. It quite superseded madder, and drove it out of the market. In fact, there was no product at present known which could compete with it. Yet, in spite of these favourable circumstances, the price of anthracene was now 9d. per unit. Even at its present low price, there was the greatest difficulty in disposing of it, because purchasers believed that it might fall even lower—to 8d. or, possibly, 7d. per unit. He believed that was a state of things which could be, and ought to be, altered, and that if some of the large companies would determine to have a fair price for their residual products, the people who used them would have to pay it. An advance of 1d. per gallon in the price obtained for tar would make a difference of £70,000 or £80,000 a year in the revenue of The Gaslight and Coke Company. The Sheffield Company would benefit by it, and would support an effort to obtain it; but unless the largest Company in the world would take the initiative, or be open to reason and argument, there was little chance of an increased price being realized. He had on several occasions called attention to the very low price of residuals, and so far, he feared, with very little result; but the time would come when directors of gas companies would have to change their mode of procedure, and show more tact, ability, and intelligence in conducting their affairs than many of them had hitherto done. Some time ago he was challenged as to the management of the Sheffield Company in this respect; and at the last meeting he answered the challenge. At that time, however, there was no return for 1891 as to the prices obtained for sulphate of ammonia by the Sheffield Company and by The Gaslight and Coke Company; but since then he had seen the return. The Sheffield Company obtained for sulphate of ammonia in that year 1s. 9·24d. per ton of coal carbonized; while the Gaslight and Coke Company—though more favourably situated—obtained only 1s. 4·83d. per ton of coal carbonized. If the latter Company had obtained the same price as the Sheffield Company during that year, for this article alone they would have received £38,387 more. He was justified, he thought, in calling attention to this; and he did so, not in any spirit of antagonism, but in order to show that companies who looked after their business, and saw that it was properly managed, obtained better prices and results. In conclusion, he referred to the necessity of

consumers looking to their gas-burners, if they would obtain as good a light as possible for the money they paid.

Mr. J. W. HARRISON seconded the motion, which was unanimously carried.

The dividend recommended having been declared, and the retiring Directors re-elected,

An extraordinary meeting was held for the purpose of authorizing the raising of £76,071 by the creation of 25,357 new ordinary shares of £3 each, to be called "F" shares.

The CHAIRMAN moved a resolution empowering the Directors to create these shares. He said this sum would bring them to the end of the capital they were entitled to issue under their present powers; and they were raising it because they were compelled to go to Parliament for a Provisional Order during next session, for constructing works for making and storing gas on the land at Brightside they had recently purchased from Earl Fitzwilliam. They could no longer delay going on with the works there; and they were completing a tank which was partially formed some years ago, and building an entirely new one. The expenditure on these works would be very large; and, seeing the present state of the market for residuals and coals, they desired to be in a position to obtain fresh capital on better terms than they would have to pay if they called up their share capital. They could not say in what position they might be, but the shareholders might depend upon it the Directors would consider their interests, and the interests of the consumers. They had no doubt their application would be assisted by the authorities of the town; and they trusted that in the future the conduct of the Company would be the same as it had been in the past, and give satisfaction to those associated with it and those who had to use the article it supplied.

Mr. HADFIELD seconded the resolution, which was carried.

The proceedings then terminated.

The Corporation and the Proposed Provisional Order.

At the Meeting of the Town Council on Wednesday, an application by the Gas Company for the consent of that body to their Provisional Order was under consideration.

Alderman LANGLEY moved that the matter be referred to the Parliamentary Committee, with instructions to report on the 12th of October, whether or not the Council should consent. He explained that in the ten years from 1881 to 1891, the consumption of gas in Sheffield had increased 59·37 per cent.—from 1237 million cubic feet to 1956 millions. It therefore became necessary to extend very considerably their powers of producing and storing gas. The Order proposed first to enable the Company to erect works and manufacture gas and residuals on land adjoining the Grimesthorpe works. They had plenty of land at Neepsend, but could not extend their plant at Grimesthorpe without a Provisional Order. The next clause was to alter the mode of testing the gas, by the adoption of the London standard burner, which was now used all over the kingdom. No other large company in the country tested the gas in the same way as Sheffield. The illuminating power of the gas would not be at all interfered with. By the present mode, it was of 15-candle power, and by the new method, it would be 16½ candles; but the actual quality would be the same. The next clause proposed to authorize the creation and the issue of debenture stock. The Company's Act empowered them to raise in share capital £868,000. The previous day they resolved to issue £76,000 more capital; and at a meeting of the Directors a call of 12s., or 20 per cent., was made on the new shares, which would be payable in October. This would make the called-up capital £746,000, bearing 10 per cent. interest, and would leave uncalled £122,000. To call this up and pay 10 per cent. would necessitate an increase in the price of gas; but the Directors proposed, instead of this, to ask for powers to borrow £289,000 on debentures, which would be issued in lots of £50,000. It was estimated that at the present time a £100 debenture bearing 5 per cent. interest would realize in the open market £140; so that £50,000 of debentures would probably bring in £70,000. They would thus, practically, pay 3½ per cent. for the £70,000, which was as cheap as could be expected by a manufacturing concern. Unless the money was borrowed in this way, the price of gas would have to be increased; but he was glad to say the Directors were exceedingly anxious to avoid this. If they moved at all, it would be in the direction of lowering the price; and when it was remembered that other large companies had raised their charges, the fact that the Sheffield Company had paid 10 per cent. without doing so showed, he thought, that the Company had managed their affairs well. The other clauses would authorize them to allow interest on sums deposited as security before meters were fixed or gas supplied, and to declare forfeited any dividends unpaid for twelve years.

Alderman GAINSFORD seconded the motion.

Mr. STYRING asked whether the Company had any borrowing powers without the consent of the Council, and whether, if the Council gave their consent, the Company would be willing to give an undertaking not to issue any further share capital until the borrowing powers were exhausted.

Alderman FRANKLIN suggested that the Parliamentary Committee should consider what was the true object of the Directors in issuing 5 per cent. debenture stock, when they could probably raise the money at 3 per cent. or 3½ per cent. The Committee would probably see that the object was simply to increase the borrowing powers by £120,000 or £130,000, and raise £400,000 instead of £289,000. Why should not they make it a 10 per cent., or even a 20 per cent. stock? It seemed to him that the policy would be just as sound.

After further discussion,

Alderman LANGLEY, replying to Mr. Styring, said the Company had at present no borrowing powers apart from their share capital; but they had power to call up more shares to the amount of £120,000, which would necessitate an increase in the price of gas.

The resolution was then carried unanimously.

Richmond (Surrey) Water Supply.—The Water Committee have resolved to recommend the Richmond Town Council to apply to the Local Government Board for power to borrow £7300 for completing and further extending the water-supply works.

THE PROPOSED EXTENSION OF THE BELFAST CORPORATION GAS-WORKS.

Report by the Corporation Gas Engineer.

It may be remembered that, when noticing a fortnight ago the reports by Mr. Corbet Woodall and Mr. W. Foulis on the above subject, it was mentioned that the Corporation Gas Engineer (Mr. James Stelfox) had been instructed to prepare a report from his point of view regarding the suitability of the various sites proposed for the new gas-works. He has now presented his report to the Gas Committee, by whom it was discussed at a private meeting yesterday week. It is understood that they then decided to recommend the Council to select a site other than that proposed in Ormeau Park.

In the opening sentences of his report, Mr. Stelfox calls attention to the very perilous position in which the public are placed owing to the delay which has occurred in carrying out the works necessary to ensure a proper supply of gas for the rapidly-increasing city. The returns for the financial year lately ended, he says, afford an emphatic reply to those who consider that gas has seen its best days as an illuminating agent. When he reported in November, 1880, on the desirability of extending the works, the year's make of gas was 502 million cubic feet. At that time the new section of the works was in reserve; the old section being worked up to its full capacity. Owing to the terrors of electric light being threatened, the Committee of that day were, unfortunately, deterred from carrying a project of which they had practically approved; and from that time to the present, it has been found impossible to persuade the public that money should be spent on the extension of the gas-works. He has no hesitation in saying that, if the gas undertaking had remained in the hands of a private company, additional ground would have been acquired ten years ago, and new works would have been constructed. The make of gas for the year to June 30 last was above 1115 millions—an increase of more than 122 per cent. since the necessity for extension was formally brought forward twelve years ago. This increase has simply been met by working every department of the works at what may be called "high pressure." The present establishment should never have been required to produce more than about 800 million cubic feet per annum—a margin of 25 per cent. being allowed for emergencies. As a matter of fact, they have had in most of the departments no margin whatever for years past; and the failure of any portion occurring at mid-winter would have produced disastrous results. The worst, however, has yet to come. In order to meet the demands of the immediate future, it has been rendered imperative to construct a new retort-house, with which it is hoped to be able to increase the producing power by at least 25 per cent. This margin would not be too much to allow for the existing demand for gas. But if the increase of the past few years is to be maintained, Mr. Stelfox holds that they must look forward to something like the following consumption: Year ending June 30, 1893, 1200 million cubic feet; 1894, 1290 millions; 1895, 1390 millions; and 1896, 1500 millions. When the coal-stores were built, they contained when full seven weeks' supply at mid-winter. At the present moment they could only hold 3½ weeks' supply; and in 1896, according to the figures given, they would only contain about 2½ weeks' coal. The purifiers would have to be extended in some way—possibly by reconstruction in two storeys. The ground, however, is at this moment far too small to permit the proper treatment or disposal of purifying material. Four years hence, with increased quantities of material to dispose of, the difficulty would be most acute. As regards gasholders, they were a few years ago able to store about 1¼ maximum days' consumption. Now, they can only store six-sevenths of a day's maximum requirements; and in four years, the storeage will represent less than two-thirds of the maximum day. He does not hesitate to say that the yearly cost which could be saved if more extensive premises were available, would more than pay the interest on a capital expenditure of £150,000. Referring to the question which has been raised as to the large extent of the land required, Mr. Stelfox remarks that, assuming the expenditure on gas-works on (say) 40 acres amounted to £1,750,000, the economy of putting up the necessary plant on (say) 25 acres, thereby saving £375 per annum in rent, and perpetuating the present "high-pressure" system, at a loss of thousands per annum, would be more than doubtful. If 60 acres were available instead of 40 acres, it would be all in the interests of economy to take the larger lot. It may be interesting to know that, in order to provide for 40 days' supply of coal for a works of the size projected, and assuming that the coal was trimmed to an average height of 12 feet, the stores would cover 6 acres, or 15 per cent. of the whole area suggested to be taken. With their requirements in respect to other materials—such for instance as retorts, retort mouthpieces, and connection pipes—it is absolutely necessary that they should store them largely; and hence, when pressed in the winter season, they have either to keep moving them from place to place, or, as generally happens, bury them under the heaps of coke and breeze which are sure to accumulate at this time of year. Much will, of course, be said as regards the competitive influence of electric light. This bugbear has never done us any injury, save that of interfering with much-needed extensions. The homely paraffin lamp has never been held up as a "bogie" to us; and yet the use of this means of illumination has a hundred times more effect on the demand for gas as an illuminant than the electric light has ever had, or is likely to have. Having reminded the Corporation of their grave responsibilities as gas suppliers, he mentioned that during last year they had an increase of 900 consumers, following a similar increase the previous year.

Assuming that the necessity for gas-works extension is proved, Mr. Stelfox turns to the question of sites for new works, and the reports of the Consulting Engineers. As these reports are very similar, he does not discuss their general recommendations. From the results of the borings which have been made, Mr. Stelfox thinks that the assumption of Mr. Foulis that a reliable foundation could be had on the Harbour Commissioners' ground at a depth of 30 feet from the ultimate yard level—*i.e.*, 17 feet below the existing ground level, and 7 feet lower than Mr. Woodall's estimate—is quite problematical. The cost of filling up alone he estimates, for the 40 acres, at £105,000. From this might be deducted the spoil arising from excavation of the gasholder tanks—say,

£7500—which would serve as filling-up stuff; and the balance would be £97,500. This would be but a small proportion, however, of the actual extra cost. The cost of the extra strength required in (say) four gas-holder tanks, he places (taking a very moderate price for the work) at £25,000. Apart altogether from the question of first cost, there was also the very important element of security. Both the Consulting Engineers, reporting independently, have given a warning that, notwithstanding the most costly precautions, there is always a risk in such ground as he was referring to of failure and disaster. He does not think the sum he originally mentioned—viz., £250,000—would more than represent the difference between the cost of a complete works for 20 million cubic feet per day erected on this land, as compared with the same works constructed on ground in which a good foundation could be had at or about the finished level. In support of his figures, Mr. Stelfox refers to the published cost of the Beckton Gas-Works; and then he proceeds to remark that the possible necessity for an enormous extra outlay on foundations in such ground has not been seriously questioned, but it is asserted that the extensions projected may not be required for 50 or 100 years. As he cannot profess to prophesy, Mr. Stelfox falls back on the experience of the past 40 years, during which it has been found that the demand for gas has nearly doubled in each decennial period. Belfast required in the year just closed 1115 million cubic feet of gas, as against 88 millions in 1852. He, therefore, ventures to submit that the suggested works, to produce when complete 20 millions per day —*i.e.*, three times as much as the present requirements—would be only a reasonable provision for the next 20 years. It will be noticed that Mr. Stelfox's observations are based solely on the consideration of the nature of the ground, and not on any special preference for any particular site. At the same time, he remarks, it must be clear to everyone who has given the subject the least consideration that, among the sites deemed to be available, the only one which would be free from the objections stated is that at Ormeau Park. He has therefore recommended it, believing that in so doing he was consulting the best interests of every class in the community. He admits that a strong feeling has been aroused against the scheme; and it has been suggested that land at Glentoran can be had, which would answer the purpose equally well. He is not aware by experience of the nature of the ground there, but should suppose that at least the greater part of it would be similar to that of Ormeau Park. The only objection he can see to the proposal is that there are only something like 20 acres in the lot; and he does not think it would be wise, or, indeed, possible, to construct on such an area works which would provide for more than about ten years to come.

BRADFORD CORPORATION GAS AND ELECTRICITY SUPPLY.

The Half-Yearly Financial Statement.

At the Meeting of the Bradford Town Council last Tuesday, Alderman Priestman presented the accounts of the Gas and Electricity Departments for the half year ended June 30 last. Dealing with the electricity supply first, he said that the total expenses on revenue account during the six months were £1573; and the total revenue £3216—leaving a trade profit of £1642. The interest paid on loans out of this sum amounted to £678; and the contributions to the sinking fund were £577—leaving a net profit of £387. At the end of the present year, the Corporation would have contributed to the sinking fund since the construction of the works, £3027. Up to the present time, the actual amount contributed to that fund was £2449. The total liabilities at present in respect of loans were £42,342; and the floating liabilities amounted to £47,836. There was also £400 excess of assets repaid through the sinking fund; and £2756 was in the bank on sinking fund account. Up to the present time, there had been a total loss since the commencement of the works, of £799. There had been expended on capital account during the half year £5430; and under the heading of floating assets, there appeared in the accounts a sum of £1029 in respect of sundry debtors, and £165 in respect of sundry materials—bringing up the total amount of floating assets to £1194. The total assets on the capital account were £49,615. Since the commencement of the works, there had been paid in interest and on sinking fund account £5625. The trade profit which had been made amounted to £4825. There was a loss of £1079 on the first half-year's working; in the second half year, £732; in the third, £315; and in the half year ended June 1891, £30—the total being £2157 6s. 8½d. At the end of December last, there was a net profit of £970; and at the end of June of the present year, it was £387. If the total net profit were deducted from the total net loss, it would show a net loss of £799 still to be made up. He thought a considerable portion of this sum would be made up before February or March, when the next half-year's accounts were presented. With regard to the Gas Department, the expenditure had been practically the same as during the corresponding period of 1891. The revenue account showed an increase of about £1000 in the cost of coal; but all the principal items of expenditure remained very much the same as a year ago. The total amount of expenditure had been £94,535, against £94,685 in the corresponding period of last year; and the net result was a profit of £2157 this year, compared with a profit of £6250 last year. The falling-off in the profit was entirely due to the reduction in the value of the residuals. The receipts on account of gas sold showed an increase of £2848; but with respect to the sale of coke, there has been a falling off to the extent of £4390. There was a decrease of £612 in the sales of tar; and a loss of £1000 in the sales of chemicals during the half year. He thought the prospect of making a profit in the Gas Department, over and above the amount of profit which they fairly claimed to make from the fact that the lamps were lighted out of revenue, was very small indeed. The number of lamps in the borough was now 7232—an increase of 130 on the half year. In conclusion, Alderman Priestman said that, so far as he was concerned, he would be glad if the Corporation would not listen to any suggestions that the price of gas should be raised. Should there be a loss on the gas account, he should prefer a small lamp rate. The accounts were adopted.

THE TECHNOLOGICAL EXAMINATIONS OF THE CITY AND GUILDS OF LONDON INSTITUTE.

Tar and Tar Products.

In a previous issue of the JOURNAL, we gave the question papers set in the last examinations in "Gas Manufacture" conducted under the auspices of the City and Guilds of London Institute. As the education of the gas engineer cannot be said to be complete without some knowledge of the various methods of dealing with the residual products of the carbonization of coal, it may be interesting to some of our readers to give the papers set to the candidates who submitted themselves for examination in the subject of "Coal Tar and Tar Products."

The Examiner was Mr. A. G. Green; and though he gave ten questions in each section of the Ordinary Grade, and a similar number in the Honours Grade, only eight had to be answered. In the former grade, however, the candidate had the option of confining his answers to questions in one section only, or in both. The questions were as follows:—

Ordinary Grade.

I. *The Distillation of Tar.*—1. Give an account of the methods by which such liquids as benzol, aniline, &c., are valued for commercial purposes. 2. How many naphthols are known? Describe their manufacture (giving sketches of the plant), and specify the characters of each. 3. In what operations is steam distillation resorted to in the factory? Illustrate your answer by sketches of the plant actually employed in the operation you are describing. 4. Write the formula of phenanthrene. State in which portion of the tar it is found, and how you would separate it. Has any use been found for this hydrocarbon in the colour industry? 5. What is the average amount (per cent.) of benzol heavy oil, creosote oil, and anthracene oil obtained from any particular tar that you are familiar with? 6. Give the names and formulæ of the hydrocarbons of the benzene series found in coal tar. Describe some of the uses of the higher boiling hydrocarbons of the series. 7. A hydrocarbon may be xylene or ethylbenzene. How would you determine the nature of the hydrocarbon by a chemical method? 8. A gas liquor was found to contain 20 grammes of total ammonia per litre. How much ammonium sulphate is theoretically obtainable from 1000 litres of this liquor, and how much would you expect to get practically? 9. Ethylaniline and dimethylaniline are said to be isomeric. Explain the meaning of this term, and mention two chemical methods by which you would discriminate between these two compounds. 10. Explain briefly the principle of "fractional distillation," and describe some operation in the factory in which this principle is made use of. Give an explanatory sketch of the plant.

II. *Coal-Tar Colouring Matters and Other Products.*—1. Certain colouring matters known as "gambines" are known in commerce. Give the formulæ of some of these compounds, and describe their manufacture. 2. How much sodium nitrate (96 per cent.) dianisidine and naphthionic acid are required to produce 10 lbs. of the colouring matter known as "benzopurpurin 10 B"? 3. What is "quinoline yellow"? Give its formula, and describe its manufacture. 4. Give the formulæ and describe the manufacture of the hydrazines used in the colour industry. 5. What is the substance known technically as "propiolic acid?" Give an account of its manufacture, with formulæ, showing the successive chemical transformations of the materials. 6. Which derivatives of quinoline are of importance in the manufacture of pharmaceutical products? Give their formulæ and mode of preparation. 7. Give the names and formulæ of some of the azoxy-compounds employed in the colour industry, and mention their uses. 8. A colouring matter is produced by the action of diazotized amidoazotoluene monosulphonic acid on a monosulphonic acid of β-naphthol; another colouring matter of the same composition is produced by the action of diazotized amidoazotoluene on a disulphonic acid of β-naphthol. How would you determine the formulæ of these two colouring matters? 9. A substance known as "artificial musk" has recently been introduced. State what you know about its composition and manufacture. 10. Dichlorbenzaldehyde is used for the production of a certain colouring matter. State how this substance is made, and the use to which it is applied.

Honours Grade.

1. Give an account of some recent researches which have thrown light on the constitution of the indulines. 2. Draw a rough outline plan, showing how you would lay out a factory for the manufacture of coal-tar colouring matters. The raw materials may be assumed to come from the tar distiller. 3. Seven basic colouring matters, soluble in dilute hydrochloric acid, are given to you for identification. On reducing with zinc dust, and filtering, the different solutions give the following results when streaked on white paper: (*a*) becomes red, (*b*) becomes orange, (*c*) becomes yellow, (*d*) becomes green, (*e*) becomes blue, (*f*) becomes violet, (*g*) remains unchanged. What compounds would you suspect under *a*, *b*, *c*, *d*, *e*, *f*, and *g* respectively? 4. Describe and give a sketch of some form of plant that has been devised for rendering the distillation of coal tar a continuous operation. 5. Give, as far as known, the constitutional formulæ of the sulphonic acids of α- and β-naphthylamine at present in use, and state how these sulphonic acids are made. 6. What is anthracene yellow? Give its constitutional formula and describe its manufacture. 7. Certain colouring matters, formerly supposed to be nitroso-derivatives, are now regarded as isonitroso-compounds. Summarize the evidence on which this change of formula is based. 8. A coal-tar hydrocarbon gave on analysis the following results: C 90, H 10 per cent. Vapour density, 60 (H = 1). How many aromatic hydrocarbons of this formula are known? Give their constitutional formulæ, and state what products they furnish on oxidation. 9. Give an account of the preparation and properties of "fluorescent blue" or "resorcin blue." To what group does this colouring matter belong? State what recent researches have been made in connection with this and allied colouring matters. 10. Write a description and give sketches of some form of still for the recovery of ammonia from gas liquor. Describe the operation as carried out in the factory.

THE GAS QUESTION AT ECCLES.

Rejection of the Proposed Bill by the Ratepayers.

Last Wednesday, a Statutory Meeting of ratepayers was held at Eccles, for the purpose of considering the proposal of the Local Board to proceed with a Bill in the next session of Parliament for manufacturing and supplying gas to Eccles and the other out-districts of Salford, except Prestwich.

The Chairman of the Eccles Local Board (Mr. J. C. Mather), who presided, proposed that that body be authorized to proceed with the Bill. He explained that, since the ratepayers objected last November to the promotion of a Bill, the circumstances had entirely changed. One of the objections then raised was that Salford had not been approached to ascertain whether the Gas Committee were willing to abolish the differential rate. A deputation from the Board had lately waited upon the Committee; and the result was that they had reduced the differential rate 2d. per 1000 cubic feet. This concession was not equal to the advantages which the Board would gain by applying to Parliament for a Bill to make their own gas. Mr. Parr explained that it was expected that the Charter of the new borough would have been received early this year; and that the new Council would have been elected by April 1. In that case the Council would have been enabled to take advantage of the clause inserted in the Salford Provisional Order giving Eccles and Swinton the power, jointly or separately, to make and supply gas. If the meeting gave the Board power to deposit their Bill, further action would be taken by the new Council. The Board had now no guarantee that Salford would not again advance the differential rate; and if they did not promote a Bill now, the gas consumers would be at the mercy of Salford—a position they had been in for a number of years past. If the consumers allowed this opportunity to pass, they would never again have the chance of proceeding with a Gas Bill without the opposition of Salford. Mr. Halliwell remarked that in 1854–5 Salford charged 5s. per 1000 cubic feet; but since then the price had been reduced to 2s. 6d., for which the consumers ought to be thankful. Mr. Arrowsmith said that, if the Local Board estimated the cost of erecting gas-works, the rearrangement of the gas-mains, and the purchase of a portion of the Salford gas undertaking at £120,000, they would proceed on a blind track, because they could not tell the amount of the compensation which Salford would demand. On the motion being put to the meeting, a large majority voted against it; and the Chairman declared it was not carried.

In last week's issue, we briefly noticed the report of the Special Sub-Committee, appointed by the Eccles Local Board to inquire into the gas supply of the district; and we are now able to publish some additional particulars therefrom.

The document commences with an expression of the Committee's opinion that this is the most important matter which the Board have been called upon to decide during the whole of its existence; and, having carefully investigated the whole subject, they think it would be to the advantage of the gas consumers and the ratepayers of the district if they consent to the Board taking the preliminary steps for passing a local Gas Bill through Parliament. The Board must of necessity do this, if they are to take advantage of the clause obtained from Salford in their Provisional Order of 1891, since, owing to the limited time allowed for depositing a Bill, the new Council to be elected Nov. 1 cannot possibly comply with the parliamentary regulations relating thereto. The Committee state that they approached the Salford Corporation with a view to getting the differential rate abolished. The Corporation Gas Committee decided to reduce the price of gas 2d. per 1000 cubic feet to all the out-districts; the price thus becoming 2s. 6d. This was the utmost they would do; but Eccles, the Committee argue, has no guarantee nor would the Salford Corporation give any undertaking, that the differential rate shall not exceed 2d. per 1000 cubic feet to the out-districts. If, therefore, the ratepayers allow the present opportunity to manufacture gas to pass by, there is good reason to expect that the present charge will not be maintained, but that at no distant date it will be advanced. The maximum price which the Corporation are allowed to charge is 5s. per 1000 cubic feet. The actual cost of making and supplying gas, including interest upon capital and contribution to sinking fund, was in—

	1887.	1888.	1889.	1890.	1891.
	2s. 5½d.	2s. 3½d.	2s. 1½d.	2s. 3½d.	2s. 0½d.
Profit ..	£32,741	£38,536	£37,135	£12,968	£28,994

Within the limit of 5s. per 1000 feet they may, of course, charge what price they please; and there is therefore no limitation of profit. But so long, remark the Committee, as the price does not exceed an extravagant and impossible limit, the Corporation may take (say) 20 or 30 per cent. upon their investment in the Eccles district if they choose. The contention in the district has been for years that, while profits such as have been stated are being made, it is grossly unfair to continue charging Eccles a specially high or differential rate. If no profits were made, the out-townships should pay something extra, because they contribute none of the capital and take none of the risks. But where large profits are made which all go to Salford, the Committee consider it an insult to a district like Eccles to insist upon its paying a double share of them. The report next refers to the case of Oldham, where the out-districts obtained a Parliamentary Order defining the amount of capital, limiting the profits to 6 per cent. upon the sum actually owing by the Corporation from year to year on account of their gas-works, and abolishing the differential rate. These terms were asked from Salford; and the reply was that on no account would the differential rate be abolished. The Committee conclude their report by remarking that, should the Board "decide to manufacture gas, the consumers, being all ratepayers, can exercise an important, even a commanding influence upon the administration of the gas undertaking; and further, as the profits made will be spent in public works or in relief of rates otherwise, each consumer will feel that what he contributes to them he will receive back, at least in part, as a ratepayer."

Accompanying the report is a table showing the prices charged for gas and the profits made by a number of important undertakings, both large and small, in Lancashire and Yorkshire; also a report recording the proceedings of the Gas Committee in connection with the interview which a deputation had with the Salford Gas Committee, in order to ascertain what concessions they were prepared to grant to the out-districts, and the result of which is referred to in the foregoing paragraph. The report by Mr. Corbet Woodall follows; and this we give *in extenso*—

Taking the price of gas now at 2s. 6d. per 1000 feet, the question is, Can you with a local works make and supply at that rate, and have a margin in hand? To the query I answer confidently, "Yes." If all the out-districts are supplied from the new works, you will commence in the winter of 1894 with a sale of about 195,000,000 cubic feet.

This at 2s. 6d. will yield a revenue of	£24,375
I estimate the cost of making gas of at least equal quality to that now supplied at 19d. per 1000 feet. This amounts to 195,000 at 19d.	15,438
Leaving gross profits	£8,937
The capital necessary for the erection of the works, purchases of Salford property, re-arrangement of mains, &c., I estimate at £120,000. If this is raised at 3¼ per cent., the charges will be for interest £3,900	
Sinking fund, 40 years at 3 per cent £1,584	
	£5,484
Balance to the good	£3,453

This you will see is equal to more than 4d. per 1000 feet of profit. If the price recently charged by Salford—viz., 2s. 8d. is taken—the profit would be equal to more than 6d. per 1000 cubic feet. The estimated cost of gas given above comes to 2s. 2d. per 1000 feet, against 2s. 0¼d. at Salford in 1891. You may be told that because of the reduced value of residual products from coal, the price of gas will go up. I think this very unlikely; but, if it should happen so, it will affect Salford equally with you, and they would raise your charges as well as their own. Should you not supply the whole area but Eccles only, the margin of profit will proportionately to the business done, be equal to my estimate for the whole. The piece of land selected by the Board near the Ship Canal is very well suited for the purpose. The position upon the side and below the level of the Ship Canal will give access to all the coal-fields of the neighbourhood, and will ensure cheap delivery. The land is also in a position where the manufacture of gas cannot be spoken of as a nuisance; and its level is all that could be desired for distributing from. The only objection is that it is rather far removed from the retail market for coke. Even in respect, however, to the supply of coke for the district, it will be very much better served than it is now when all that is used is brought from Salford. To connect our proposed new works with the main will involve the laying of about 1250 yards of 20-inch main at a cost of £2000. When this is done, all the other pipes will be served as they are now. This is a very small matter indeed. For convenience of connection, the position of the new site is admirable. If the whole out-districts are supplied by Eccles, then an enlarged pipe would be laid up Green Lane and Folly Lane to the south end of Hartington Lane. This would cost £3200, and would give complete command of the whole district. Some short lengths of pipes on the east side of Eccles would be rather larger than necessary; but the excess is hardly worth consideration. The electric light is not a competitor likely to interfere with the steady growth of the gas business in your district; but, on the contrary, is not unlikely to add to it. The best way to distribute electricity in your district is, in my opinion, by means of gas, setting up small stations where the demand arises, and working the dynamos by gas-engines.

WIDNES LOCAL BOARD GAS AND WATER SUPPLY.

The Engineer's Salary—The Progress of the Undertakings.

A proposal of the Gas and Water Committee that the salary of their Engineer (Mr. Isaac Carr) should be increased by £100 a year provoked a long and animated discussion at the meeting of the Widnes Local Board last Tuesday. The confirmation of the Committee's minutes was moved by Mr. Brown, who, in alluding to the recommendation to increase Mr. Carr's salary, said it was made purely because of his ability as a Manager of the gas and water works. He had now been their Engineer ten years. In 1882, when he was appointed, they sold 66,296,000 cubic feet of gas, yielding a revenue of £11,835; whereas in the past year they sold 126,761,000 cubic feet, producing a revenue of £12,693. Thus it would be seen that, while the quantity of gas sold had increased 90 per cent., the money paid for it had only advanced 7 per cent. The profit on the gas undertaking in 1882 was £3145; and in 1892, £2640. It was not because the raw material was less in price that they had been able to do this. The quality of coal they used in 1882 now cost 2s. or 3s. per ton more; whereas the price of the residuals had gone down. Tar in 1882 realized £2 5s. per ton; while last year it was about £1 10s. per ton. In a similar way the price of ammoniacal liquor had decreased from 20s. to 6s. per ton. It could not, therefore, be said that it was the changes in the conditions which had enabled them to sell so much more gas for only about £800 more than in 1882; but it showed the great improvement that had taken place in the management and manufacture. Since Mr. Carr had been with them, there had been a considerable saving in the amount of coke used as fuel; and they were now able to sell about 3000 tons more than they would have done under the old *régime*. Sulphate of ammonia plant had also been put up on Mr. Carr's advice; and to show what this had accomplished, he said that if they had sold the ammoniacal liquor last year at the then market price, it would have yielded £500 or £600, whereas when made into sulphate of ammonia it realized about £1700. The gas had also been improved in quality; and the manufacturing plant had been greatly extended. In 1882, they were only able to produce 560,000 cubic feet per day, as

compared with 1,000,000 feet at the present time. With regard to the Water Department, in 1882, they pumped 527 million gallons, for which they received £11,000; while last year, they pumped 957 millions, and the receipts amounted to about £14,000. Mr. Brown concluded by referring to the many improvements which had also been made in the water-works. The motion having been seconded, Mr. Beech remarked that this matter had been sprung upon the Board previous to the election of the new Council, and he proposed that the recommendation be rejected. This was seconded; and, in the course of further discussion, several members bore testimony as to Mr. Carr's ability as an engineer—one member (Mr. Owens) stating that, by the reduction in the price of gas during his management, the consumers had been saved £13,000. On a vote being taken, the amendment was defeated by eight votes to two; and the minutes were then passed *nem. con.*

METROPOLIS WATER SUPPLY.

The Quality of the Water in August.

The returns furnished to the Registrar-General by the London Water Companies as to the water supply of the Metropolis during the past month, show that the average daily supply was 197,911,049 gallons, as compared with 185,973,866 gallons in the corresponding month of 1891; being at the rate of 252 gallons to each service. Of the entire bulk of water sent out, 100,913,925 gallons were drawn from the Thames, and 96,997,124 gallons from the Lea and other sources.

Reporting upon the quality of the supply, Dr. E. Frankland said: At the request of the Associated Metropolitan Water Companies, I have extended these monthly examinations to (*a*) the chemical and bacteriological condition of the raw river waters at the intakes of the various Companies, and (*b*) to the bacteriology of the water as it issues from the filter-beds of each Company, and before it is pumped into the distributing-mains. Taking the average amount of organic impurity contained in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies and by the Tottenham Local Board of Health was: Kent, 0·8; New River, 1·3; Tottenham, 1·5; Colne Valley and East London (deep well), 1·7; West Middlesex, 2; Southwark and East London (river supply), 2·2; Chelsea, 2·4; and Grand Junction and Lambeth, 2·5. The untreated river waters gave the following numbers: New River cut, 2·3; River Lea at East London Company's intake, 3·4; and Thames at Hampton, 4. The Thames at Hampton was not quite in such good condition as in July; nevertheless the water delivered from this source fully maintained the high degree of organic purity recorded last month. It was efficiently filtered before delivery. The water taken chiefly from the Lea by the New River and East London Companies, was also somewhat inferior to that sampled from the same source in July; but the water actually delivered by these Companies possessed even a slightly higher degree of organic purity than the samples collected in July. Both waters were efficiently filtered before delivery. The deep-well waters of the Kent, Colne Valley, and East London Companies, and of the Tottenham Local Board of Health, were of excellent quality for dietetic use; that of the Kent Company being especially distinguished for its very high degree of organic purity. The Colne Valley Company's water, having been softened before delivery, was rendered suitable for washing. All these waters were clear and bright without filtration. Seen through a stratum 2 feet deep, the Kent, Colne Valley, Tottenham, and East London (deep-well) waters were clear and colourless, the New River clear and nearly colourless; whilst the remaining waters were clear and very pale yellow. The crude river waters presented the following appearances: New River cut, turbid and very pale yellow; the Lea at the East London Company's intake and the Thames at Hampton, turbid and pale yellow. The bacteriological examination of the waters as they left the filters of the various Companies, by Dr. Koch's process of gelatine plate culture, gave the following results: One cubic centimetre of each water collected on Aug. 25, 26, and 27, developed the following numbers of colonies of microbes: Kent (from delivery-shaft of pump), 1; Chelsea, New River, and East London, 4; Southwark (No. 1 well), 4, (No. 3 well) 996; West Middlesex, 6; Grand Junction, 14; and Lambeth, 16. In reference to the high number found in No. 3 well of the Southwark Company, the Engineer of that Company writes me that, "in consequence of the construction of the new filters at Hampton, it has been necessary to employ a temporary engine and pumps to lift the water from No. 3 filter into the engine wells. In all the other cases the high degree of bacterial purity is very satisfactory; and, during the present crisis, no effort should be spared to maintain this high standard. Of the untreated river waters, the New River cut developed 631; the Thames at Hampton, 2421; and the Lea at the intake of the East London Company, 3000 colonies of microbes per cubic centimetre.

The Sheffield Corporation Water Bill.—The Water Committee of the Sheffield Town Council have approved of the draft of a Bill to be promoted in the session of 1893, to amend the provisions of the Sheffield Corporation (Water) Acts relating to the water-rents, and for deferring the period for completing the Ewden Valley reservoirs, and for other purposes. It will be submitted to a special meeting of the Council on Oct. 12.

The Stockton and Middlesbrough Water Board and the Charge to Manufacturers.—In accordance with instructions, the Clerks to the Stockton and Middlesbrough Water Board have reported to the Finance Committee of the Board on the feasibility of an application to Parliament for the repeal (in whole or in part) of the 58th section of the Stockton and Middlesbrough Water Act, 1876, which has reference to the supply of water for manufacturing purposes. Having regard to the fact that the two Corporations in 1876 voluntarily offered to extend the 3d. per 1000 gallons to all who consumed more than 5 million gallons per quarter in the whole of their extended area, they thought that the Board could not with propriety appeal to Parliament for the repeal of the above-mentioned section of the Act.

THE WAGES OF EMPLOYEES IN GAS AND WATER WORKS.

We close to-day our notice, commenced on the 30th ult., of the recently-issued parliamentary return on the above subject, by giving extracts from the portion relating to the employees in water-works.

The method of collecting the statistics contained in the return was, it may be remembered, by the issue of blank schedules, in which the particulars desired were to be entered. Altogether, 371 schedules were sent out to owners of water-works, both private companies and local authorities, with the result that 181, or 49 per cent., were received filled up. A larger number of returns might have been collected; but it was thought unnecessary to apply in the case of very small water-works—the number of men employed at such places being very few indeed. A selection was accordingly made, so as to obtain a fair sample of returns from all parts of the country, and, at the same time, to include the main part of the working population in this business. From the returns received, it is evident that it would hardly have been worth while to apply to any smaller works than those selected, seeing that the average number of workpeople on the returns for the small town districts is about six only, while the average for the works at large towns is upwards of 80. In the tables appended to the report, the 181 returns have been grouped into seven districts; and, wherever possible, large towns have been shown separately from small ones. To some extent the locality of the works does not operate quite so strongly as in the case of gas-works, because a number of the men in this trade are not employed in the towns to which the water is supplied, but perhaps many miles away. There is a further fact which should be borne in mind—viz., that, in addition to the rates for the regular staff of workmen, the rates for men employed on new works and in laying new mains are included. The number of men employed in the last-mentioned work is large, but variable; while the number engaged in the first-mentioned work is small, but pretty constant. In the large towns there were 4562 men and 60 boys; and in the small towns, only 625 men and 28 boys—the number of the boys in no case rising to 6 per cent. Nearly one-half of the men were general labourers earning about a guinea a week; and it will be found that the proportionate number of these men has a great influence in determining the relative positions of the several districts as regards the annual earnings per head. London has an average of £78 (which, as will be seen later on, is a little beyond the real average), and considerably more than any other district. The large towns, as a rule, have higher averages than the small towns; the one exception being due to the fact that in the large towns there were 55 per cent., and in the small towns only 36 per cent. of labourers. Treating the London district separately, as was done in the case of gas, the following comparison may be made:—

	Annual Rate per Head.
London district	£78
Other large towns	65
Small towns	57

The difference here is greater between London and other large towns than between the small and large towns outside the London district.

Before proceeding to discuss how far the annual averages are affected by the method by which they are obtained, it may be well to have the figures before us arranged in two groups—the one above, and the other below, the general average of the trade:—

Name of District.	Large Towns.		Small Towns.	
	Number.	Annual Rate.	Number.	Annual Rate.
Above Average (£67).		£		
London, including Tottenham and Croydon	1,112	78	..	..
Eastern and midland counties	643	72	..	..
South Lancashire, West Riding, and North Cheshire	1,667	72	..	..
Total	3,422	..	..	..
Below Average (£67).		£		£
Southern counties, Monmouth, and Glamorgan	370	54	157	59
South Lancashire, West Riding, and North Cheshire	..	..	148	57
Scotland	498*	57*	..	..
Eastern and midland counties	..	..	198	56
Northern counties, including North and East Ridings and North Lancashire	327*	56*	..	..
Ireland	155*	36*	..	..
Total	1,350	..	503	..

* Includes some small towns.

In this table the extremes range from £36 in Ireland to £78 in London. Probably the rate for Ireland is a little below, and the rate for London a little above, the real average; but the figures are found to be substantially confirmed by the weekly rates of pay. Apart from Ireland, there is but little variation in the lower group—from £54 to £59 per annum; but the gap between the lower and the higher group is most marked, mainly because the higher group consists of London and the great towns in the Midlands, Lancashire, and the West Riding, all of which constitute important industrial centres, where wages rule high as compared with the other parts of the kingdom. The figures given in this table do not include any of the extra remuneration received by some of the workpeople. About 5 per cent. of the total number of men (principally turncocks, reservoir keepers, engine-drivers, and stokers) were allowed free cottages; and about 1 per cent. were provided with rooms at a low rent. With certain exceptions, the weekly value of such cottages is included in the weekly rates of wages. In addition to this, about 7 per cent. of the men were reported as supplied with some kind of uniform, especially men who had to dea[l]

with the public in the discharge of their ordinary duties. No estimate has been made of the value of this extra; and the weekly and annual rates do not include it. There was very little overtime worked except in cases of emergency; but any money earned in this way is included in the annual amount, and not in the weekly wages. These items are not sufficient to have any important bearing on the comparisons between district and district.

To ascertain whether the averages obtained by dividing the total amount paid in 1885 by the numbers employed at October, 1886, are correct, it is first of all necessary to see whether the October number was a proper divisor to use, One of the tables in the appendix shows the variation in the numbers employed in 1885, as compared with the October number, so far as these particulars were given in the returns furnished to the department. The figures for 148 water-works were:—Number employed at Oct. 1886, 5177; number employed in maximum weeks of 1885, 7437; number employed in minimum weeks of 1885, 4677. Here the minimum number is 10 per cent. only below the October number, while the maximum number is 44 per cent. above; and the extreme difference between the highest and the lowest numbers represents a rise of 59 per cent. On the whole, the variation shown is considerable, and points to the conclusion that the October number, through being so low, produces annual averages that are somewhat too high, especially in the case of the large towns where the approximation of the October number to the minimum number is very marked. In all cases the variation in the amount paid in the maximum and minimum weeks of 1885, as compared with the average week of 1885, corresponds very closely to the above figures, and tends to confirm them. Some of this variation is undoubtedly due to extra men having to be called in to do special work.

The comparison between the annual averages for the year 1885 with the annual averages built up from the weekly rates in 1886 does not afford very safe guidance as to what wages were lost for short time, if the whole body of men for which rates were returned are considered; but as regards the permanent staff, it appears, from information furnished by the employers, that the loss for short time must be very small. Most of the permanent staff were paid weekly wages, which were not stopped on account of holidays, and only to a slight extent, if at all, for sickness.

Passing on to consider how the annual rate for 1886 is made up, we find that the largest group of men are paid at rates lying between 20s. and 25s. per week, or 2659 at an average of 21s. 11d. Below this group, there are 587 men paid at an average of 18s. 8d., most of whom were employed in the eastern counties of England and in Scotland and Ireland. In the group of men receiving 30s. and upwards, there were 907 men paid at an average rate of 34s. 4d. per week. London had 320 of these men, and Lancashire and the West Riding nearly 200. But although these districts had the largest numbers, it was in the small towns of the South of England that there was the largest proportion of these men—no less than 33 out of every 100 in this district earning 30s. or more per week. Altogether, the figures are as follows:—

	Number of Men.	Percentage of Total.	Average Rate.
Paid 30s. and above . . .	907 ..	17·5 ..	34s. 4d.
„ 25s. and under 30s. .	1034 ..	19·9 ..	27 2
„ 20s. „ „ 25s. .	2659 ..	51·3 ..	21 11
„ under 20s.	587 ..	11·3 ..	18 8

The number of separate occupations of employees at water-works is small. The work is mainly carried on by a small staff of trained men, and a large number of labourers, the percentage of whom on Oct. 1, 1886, was in no district less than 34 per cent. The rates of wages of these men varied from 19s. 1d. to 23s. 2d.; and, as before mentioned, this class has a commanding influence on the annual average rates.

With regard to the hours of labour, in nearly all districts they were, for ordinary six-day workers, from 54 to 60 per week. But in Lancashire and Yorkshire, 49½ to 56½ hours were general; and in Scotland, 57 to 60 hours. Many of the inspectors of fittings, meter readers, and others similarly engaged, worked rather less than 50 hours per week. Engine drivers and stokers were on duty about nine to twelve hours per day. Turncocks, reservoir keepers, watchmen, and gatekeepers, as a rule, had no definite hours—the turncocks being considered to be always available for duty.

The reports sent to the Department show that the rates of wages have altered but little since 1886; any changes that may have taken place being chiefly in the pay of individual men. Such increases are probably more in the nature of rewards for long service than changes affecting the wages of large classes. The only class in which there has been anything like a general rise is that of the labourers. As respects hours of labour and the overtime rates of pay, very few changes have been made; but while the pay shows a tendency to go up, the hours, on the other hand, are being reduced.

In summarizing the result of the comparison of the weekly rates of wages paid to the men in each trade included in the returns, Mr. Giffen states that the gas trade has the largest proportion of men paid at rates above 35s. per week; the difference being most marked in the group of "35s. and under 40s." Most of the men employed in gas-works earn wages ranging between 20s. and 35s. per week; those engaged at water-works receiving from 20s. to 25s. weekly. In every district except one (where the rates are equal), the rate for gas workmen is higher than that for those engaged in water-works, especially in the London and Irish districts.

Improvements at the Torpoint Water-Works.—The St. Germans Rural Sanitary Authority have recently been carrying out some extensive alterations at the Torpoint Water-Works, which, it is confidently believed, will render the water absolutely pure. A large dam has been erected at the reservoir, which prevents the passage of water into, and leakage from, it. The sides of the reservoir have been covered with stone obtained from a quarry in the vicinity; and its storeage capacity has been increased to about 6,500,000 gallons. The service reservoir at Corbeal has been arched over with brick, and converted into a pure-water chamber. Outside the reservoir three filter-beds have been constructed, filled with Bridgwater sand; and a chamber has been built for the purpose of washing and cleaning the latter.

THE NEW WATER SUPPLY FOR CARDIFF.

Last Wednesday morning the members of the Cardiff County Council proceeded to the Taff Vawr Valley, for the purpose of witnessing the formal opening of the valves of the new Cantreff reservoir. The ceremony was performed by Alderman David Jones, Chairman of the Water-Works Committee, who has been closely indentified in these gigantic works from their very inception. A silver key, for the purpose of turning the valves, was presented to him by the Engineer (Mr. J. A. B. Williams), under whose supervision the works have been carried out. To mark the same occasion, the worthy Alderman was also presented with a handsome silver punch bowl, which had been subscribed for by his colleagues in the Corporation. After the opening ceremony, a luncheon was provided; and on Thursday a dinner was given to the men employed upon the works.

Since the year 1840, the growth of Cardiff has been marvellous; and for many years the Water Committee have been confronted with the problem as to how to secure a water supply equal to the increasing demands. When, in 1878, the Water Company made application to Parliament to borrow £200,000, the Corporation took the opportunity of acquiring the works, which they did (under their Act of 1879) for £331,953. Two years later, they found it necessary to instruct Mr. Williams to investigate and report on every source yielding an abundant supply of water within reasonable distance of Cardiff; and this resulted in the spending of £10,614 in improving the old pumping-station on the River Ely; £37,937 on new mains in the streets of the town and the suburbs; and £122,210 on the reservoirs at Llanishen. From 1885 to 1892, £374,800 has been expended on the Taff Vawr works; so that the total cost of the undertaking, including the purchase money, has been £877,534. The portion of the Taff Vawr works completed comprises: (1) The Cantreff storeage reservoir; (2) the balancing reservoirs at Cefn, Blackbrook, and Rhubina; and also the high-level service reservoir and two filter-beds (to commence with) for the future high-level service by gravitation of the suburban districts, above the reach of the ordinary supply of Cardiff; and (3) the aqueduct or conduit from Cantreff reservoir passing through the three balancing res ervoirs and terminating in two storeage reservoirs at Llanishen and Lisvane. The time occupied in the construction of the storeage reservoir has been 6½ years. It is three-quarters of a mile in length; the greatest depth of water is 82 feet; the capacity is 322 million gallons, and the top water level is 1073 feet above Ordnance datum. The total length of the central wall of the embankment is 900 feet from east to west. The puddle wall has a thickness of 30 feet at the bottom, battering to 9 feet at the top. The embankment is built on both sides, sloping upwards from a base of 600 feet to 30 feet at the top; the depth being 90 feet. On the water-face of the embankment, the lowest part of the slope consists of the "toe," which is built of massive stones all hand-packed, and containing no less than 16,898 cubic yards of stone. This toe is sloped to an angle of three to one. Above this there is a belt of shingling 18 inches thick, and next to that, and extending to the top of the embankment, rubble pitching of the same thickness above the shingling. The south slope is soiled and grassed over. The valve shaft for the sluices to regulate the withdrawal of the water is built on the inner side of the puddle wall of the embankment. It is constructed in brickwork in cement, containing about 1800 cubic yards, and is 39 feet by 23 feet at the base; and there is an additional lining on three sides, containing 966 cubic yards of clay puddle. To reduce the great pressure due to the difference of level between the straining chamber at Cantreff reservoir and the storeage reservoirs at Llanishen and Lisvane, which is 883 feet, the 32 miles of aqueduct or conduit is divided into four sections; the first being to Cefn, 5½ miles long, where a covered balancing reservoir has been constructed with a capacity of 500,000 gallons, with inlet and outlet wells, automatic sluice-valves, &c. The second section is to Blackbrook (9½ miles), where a similar covered service reservoir has been built. The third section is to Rhubina (14½ miles), where a covered balancing reservoir has been made, holding 750,000 gallons, together with filter-beds and service reservoir for the high-level supply. The fourth and last section (2½ miles long) terminates in the reservoirs at Llanishen and Lisvane.

THE POSITION OF THE WATER SUPPLY OF TYNEMOUTH.

Proposed Arbitration Proceedings.

A Special Meeting of the Tynemouth Town Council was held last Thursday week—the Mayor (Alderman J. F. Spence) presiding—for the purpose of considering a report of the Borough Surveyor and the Medical Officer of Health on the water supply of the borough, and a recommendation of the Parliamentary and Water Committee that the Council, as the Urban Sanitary Authority, should proceed to arbitration with the North Shields Water Company in order to have it determined whether "the Company are able and willing to supply water proper and sufficient for all reasonable purposes for which it is required by the local authority within the meaning of the Public Health Act, 1875, and, if approved, of passing a resolution appointing Mr. James Mansergh as Arbitrator on behalf of the local authority." The Town Clerk read the report of the Borough Surveyor and Medical Officer of Health. After dealing with the sources of supply, the report went on to say that "should the water supplied by the Newcastle Company be cut off for any reason (and that was not a mere possibility, but had actually occurred on more than one occasion), there would be, at an outside estimate, taking even the present small daily supply as a standard, not more than a six days' supply standing between the inhabitants of the borough and a water famine." This estimate, he said, was based on the fact that the reservoirs to which the Newcastle water was supplied were the one at Billy Mill and the Octagon at the Brook Farm, which held an aggregate quantity of 3,700,000 gallons. This was a condition of affairs which it was absolutely imperative to deal with promptly; and whatever steps might be taken to improve the supply, the Company should be urged to at once increase the store of water in their reservoirs. Alderman Elliot, moved that the Council,

as the Urban Sanitary Authority, proceed to arbitration with the Company in reference to the water supply of the borough, and pointed out that at present Newcastle was really the only source upon which they could depend for a supply. He thought the time had arrived when they should ascertain, in a proper and legal manner, whether they were or were not able and willing to supply the town with water. Mr. G. Armstrong seconded the motion, and said the Committee were determined that the water question should be effectually dealt with, and that the water supply of the borough should be placed upon as secure and satisfactory a basis as the Sanitary Authority, with the means at their disposal, could effect. They could not too strongly deprecate the continued use of language in connection with this subject that was calculated to cause apprehension in the minds of the public, with regard either to the quantity or the quality of the water. The great bulk of the supply which they were receiving was good water from Newcastle; and therefore there was no real cause for apprehension on the part of the public. The Mayor, at this point, asked the Town Clerk to read a letter from the Chairman of the Water Company, in reference to what was termed the excessive waste of water which had gone on in the borough, and which he could only attribute to scare arising from the notice of precautions to be observed against cholera, issued by the Corporation—one being a recommendation to flush drains well. Fabulous though it might seem, more water was used on the night of the 25th ult. than their whole supply from Newcastle during the same time. This, of course, could not continue. As the Water Company were within measurable distance of a fresh instalment of water from Newcastle, they had resumed giving constant service to the borough, and should use every effort to maintain it. At the same time, they asked the assistance of the Corporation in stopping waste during what might be regarded as a crucial period. The only other means of averting water famine would be for the Corporation to join the Water Company in asking permission of the Local Government Board to use the Shiremoor water during the intervening period, should necessity arise. Alderman Green supported the resolution, and said the Shiremoor water had so recently been condemned as unfit for domestic purposes, that he thought the fact of the Company asking leave to use it again was quite sufficient alone to show that they must have better resources than they had at present to depend upon; and the Corporation would not have discharged their duty until they had put the onus upon a legal basis. Mr. J. P. Spencer and the Mayor also supported the motion, which was carried unanimously; the appointment of an arbitrator being adjourned to a future meeting.

The Cost of Electric Light.—At the last meeting of the Wigan Town Council, a somewhat remarkable letter was read from Mr. Alfred Peck, the Managing Director of one of the largest industrial enterprises in the town, Mr. Peck said his Company were prepared to have their works lighted by electricity, but not at the price of 6d. per Board of Trade unit, or double the cost of gas, which the Corporation proposed to charge. "It appears," he said, "to be the object of the Corporation, in adopting the Electric Lighting Act, to crowd out any possible competition with the gaslight supply of Wigan." Mr. C. B. Holmes, Chairman of the Gas Committee, made a lengthy speech in reply to the letter. Referring to the charge for electric lighting by the St. Pancras Vestry, with which Mr. Peck had instituted comparison, he pointed out that this too was 6d. per unit for night supply, though only 3d. per unit is charged for the day current. He then went on to show that 34 corporations or companies who supply electric light charge an average of 7¾d. per unit, as against the proposed charge of 6d. at Wigan. About 12 out of the 34 are in or near the Metropolis, and the average charge is 7¼d.; while at Brighton, Hastings, Eastbourne, and Southampton, the price is 10d. Mr. Holmes added that, at the proposed figure of 6d. per unit, electric light would be supplied to consumers at a loss, for some few years at any rate; and a reduction could not be conceded until the loss was recouped.

The Bradford Corporation and Many Wells Springs.—A difficulty which has arisen with regard to the Many Wells Springs raises a very important question, and one the development of which will (says the *Bradford Observer*) be closely watched by all who take an interest in the Bradford water supply. The water from these springs is conveyed in conduits to the Chellow Dean reservoirs and the Whetley Hill service reservoir. The trouble which has arisen, and to settle which attempts have been made for some time, is due to a very simple cause. The Bradford Corporation possess the land immediately upon the south-west side of the Hewenden reservoir, where the springs rise; but the land above this, through which the water comes, belongs to Mr. Edward Pickles, of East Many Wells, in whose family it has been for several generations. About two years ago Mr. Pickles began to sink a shaft with the object of opening out a quarry. Stone was reached; but, owing to the presence of water, it was not possible to work it. The operations which Mr. Pickles was carrying out undoubtedly did interfere with the supply of water to the reservoir. However, believing that he was perfectly entitled to win the stone from his own property, he continued to try to clear away the water; and this he is now doing on other portions of the land. The Corporation lost no time in calling Mr. Pickles's attention to the fact that the supply was being interfered with. In the result, he took up the position—acting on legal advice—that he was strictly within his rights in seeking to get the stone out of his land, and that, if the Corporation objected to his proceedings, they should buy him out. After negotiations, the authorities had the option of purchasing the land—which is about 120 acres in extent, and contains three farms and allotment gardens—for £18,000 outright, or the minerals alone for £11,000. A Sub-Committee of the Water Committee recently visited the springs with the object of forming an opinion as to the steps which should be taken to preserve the source of supply. They afterwards reported to the full Committee, who decided that they could not recommend the Council to purchase the property at the prices named. The matter therefore rests in just the same position as before; and it does not seem likely that a settlement will be come to until legal proceedings have been taken.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Mr. J. S. Gibb, the Treasurer of the Edinburgh and Leith Gas Commission, has just completed and issued a most exhaustive analysis of the past year's accounts of the Commission, which was called for by Mr. John Jamieson, one of the Commissioners. I have frequently had occasion to refer to the want of knowledge of their business displayed by the Commissioners—a state of matters not altogether to be wondered at, seeing that every one of them has a business of his own to look after, and is also a member of some other public body which requires a certain amount of his time and attention. My complaint is not that they do not know, but that they do not take the pains to conceal their ignorance, or rather that, not knowing, they will persist in speaking. One reason why they know so little, is that the business is so much handed over to Committees that a Commissioner who is not on a particular Committee has no means of knowing anything of details. Of course, any drawback on that score would be removed if the Conveners of Committees would, as I have often suggested, explain their work when the minutes of their Committee are presented, instead of contenting themselves with a formal motion of approval as they do. This return will serve the purpose of explaining to all the Commissioners how matters stand with reference to the financial department of their business, which, after all, is the only part they can ever expect to thoroughly understand. If, therefore, they be diligent students of it, it will prove a valuable document; if they are not, its preparation will be time wasted. It remains to be seen what use Mr. Jamieson himself will make of it. The return is rather dry reading; but like Lord Rosebery's blue-book publications, it is far more interesting, not to say valuable, than any literary production can be. It is impossible to summarize it; and I shall content myself with picking out some of the principal items.

Beginning with manufacture, it is shown that the coal carbonized was 99,940 tons in the Edinburgh works, and 35,278 tons in the Leith works; the cost of the whole being £125,267. Purifying materials, &c., cost £6799; salaries and wages at works, £35,571; and repairs and maintenance of works and plant, £7791. Under distribution, the outlay upon salaries and wages of rental clerks, surveyors, and fitters was £7887; upon repairs and maintenance of pipes, £8013; and upon repairs and maintenance of meters, £4424. Management cost, in the Treasurer's department, £1619; in the Collector's department, £2880; general establishment charges were £1920; feu duties, £1028; rates and taxes, £7202; law and parliamentary charges, £336; pensions, £1474; discounts and abatements to consumers, £3706; bad debts, £520; and gas used on works and offices or supplied free of charge, £1978. These figures are merely enumeration; and they contain very little that is new, except that the charges are broken up and shown as against each of the works, which I have not given. In the next part of the return, both works are taken together; and the results are reduced to decimals—a work which must have entailed a vast amount of labour. The cost of manufacture is, for instance, divided up into the five items of coal, purification and sundries, salaries, wages, and repairs and maintenance; and each of these items is reduced to fractions to show the cost per ton of coal carbonized, per 1000 cubic feet of gas made, per 1000 cubic feet of gas sold, and the proportion due to lost gas, &c. Other heads are similarly broken up. The concluding statement shows that 135,219 tons of coal were carbonized, the average price of which was 18s. 6·34d.; that the gas made was 1,364,940,000 cubic feet; the yield, 10,094 cubic feet per ton; the gas sold, 1,212,718,850 cubic feet, equal to 8969 cubic feet per ton of coal, and 88·848 per cent. on the make; the gas used on works, &c., 8,794,850 cubic feet, equal to ·645 per cent. on the make; the gas accounted for, 1,221,513,700 cubic feet, equal to 89·493 per cent. on the make; the gas unaccounted for, 143,426,300 cubic feet, equal to 10·507 per cent. on the make; and the average illuminating power of the gas, 26·46 candles. The return is now in the hands of the Commissioners, and will doubtless be heard of at their first meeting, when the question of fixing the price to be charged for gas during the winter comes up.

The inevitable has happened in connection with the Edinburgh and Leith gas supply. The Commissioners have struggled to maintain the illuminating power of the gas at the high standard at which it was supplied by the Companies—from 26 to 28 candles—but they are at last preparing to give way. They are about to reduce it to from 24 to 26 candles. The subject has been very carefully gone into. To maintain the high standard gas, they have been obliged to charge 4s. 6d. per 1000 cubic feet, which is more than the general community will pay when oil is so cheap. This was borne home upon the Commissioners in May last, when they found that the increase of 9d. per 1000 cubic feet, which they imposed a year and a half ago, had reduced their gas consumption by 27 million cubic feet. They then directed the Treasurer to prepare a report showing the cost of gas at different standards of illuminating power. The report, which was submitted to the Works Committee on Monday, showed that the net cost of gas of from 25 to 27 candle power would be 47·48d. per 1000 cubic feet; and of gas of from 24 to 26 candle power, 46·22d. per 1000 cubic feet. The Works Committee agreed upon the lower quality; and resolved to recommend that it should be adopted, and that the price of gas should be fixed at 3s. 10d. per 1000 cubic feet. This is a reduction of 8d. per 1000 feet—a step which will be welcomed by the community, and which may be expected to result in a large increase in the output. The Commissioners have carried forward to this year's account, a sum of £27,000; and they can afford to meet a slight deficit in the current working, though, of course, they do not desire to incur it. Along with the fixing of the illuminating power and the price, there comes up the question of the coal to be contracted for. They have to fix their contracts for the greater portion of their winter's supply. This is a matter which, with careful handling, they ought to be able to work to their own advantage; and they should be able to secure coal at prices which will help them to a better result in May next than they have had for the past two years. As to the reduction in the quality of the gas, I look upon that as merely the first step in a downward

direction, and as a necessity in the present position of the coal market; and I expect they will have to go further in the same direction.

The Town Council of Portobello, moved by clamours regarding the low quality of the gas supplied by the Gas Company, called in Mr. Ivison Macadam to test it for them. His report was submitted to the Council on Monday. He found the gas to be, on June 6, 25·46 candles; on July 7, 27·77 candles; and on August 16, 23·54 candles. The Council expressed satisfaction with the first two tests; but the third they thought was lower than it should be, and they ordered that tests should be made and reported to them in February, May, and November in each year.

This week the Valuation Courts have been held throughout Scotland; and when it is considered that it is now fixed that the valuation is to be based upon the returns and not upon the actual value of the works, it is not to be wondered at that there should be a crop of appeals by the owners of gas-works. The most instructive of all the cases is that of Brechin, where the Gas Company appealed against a valuation of £700, and asked that the works should be entered at £240. The Solicitor for the Company stated that for many years the valuation was £410; but that in 1890, when the new principle was introduced, it was raised to £710. Last year's profits were £240 odd; and he asked that the sum entered in the valuation roll should be £240 or £241. The Assessor's reply was that the assessment was fixed upon the average of the previous three years' profits; and that these brought out £647. In taking the average of profits, the only deduction made was for assessment and not for management, with which they had nothing to do. The Bench, considering that to fix the valuation upon a single year's profits would lead to endless trouble, sustained the Assessor's valuation of £700. An appeal to the Court of Session was intimated; and I think was quite warranted. I understand that the three years' provision is intended to meet cases in which it is difficult to arrive at an exact return of income. There is no difficulty of that sort in the case of a gas-works; and the year-to-year method is the most applicable to them. The Kirkcaldy Gas Company lodged appeals against the valuation on their works in the burgh being fixed at £1810, and asking that it be reduced to £1722. The Bench continued the case, to allow the books of the Company to be examined. The same Company sought a reduction of the valuation of their plant in the neighbouring burgh of Dysart, from £310 to £295; but they did not appear in support of their appeal, which was dismissed. The Dysart Gas Company asked that the valuation of their works should be reduced from £258 to £105; but the Assessor agreed to fix the valuation at £180, which the Company accepted. The Prestonpans Gas Company appealed to the Haddingtonshire Committee against the value of £25 being placed on their plant outside the burgh, and stated that their profits were *nil* last year. They asked that £15 should be fixed as the valuation; and this was agreed to. This case shows a weakness of the present method of valuation; because a company, though it may possess property of value, may make no profit, and therefore the valuation would be nothing or next to nothing. In the Edinburgh Court, Messrs. Alder and Mackay, meter makers, appealed against their new Grange Works being assessed at £480, and asked that the valuation should be £380. It was pleaded that the cost of the works was £6000; and that 6 per cent. on that sum, with £80 added, was a liberal allowance for the annual value. The Assessor said that 7 per cent. was the usual basis on which manufactories were assessed; but to this it was replied that outside of Edinburgh there were no manufactories in Scotland with which to compare the one in question, and that if the premises were let they would not realize anything like £480. The Court, without giving a reason, restricted the valuation to £450.

The shareholders of the St. Andrews Gas Company held their annual meeting on Wednesday. They were congratulated on the continued prosperity of the Company; and on their extremely satisfactory position, Mr. Hall, the veteran Manager, was both warmly complimented by the Chairman and formally thanked for his excellent conduct of the business. During the year, the Company used about 3000 tons of coal, at an average price of 21s. 7d. per ton; and gas was sold at 3s. 9d. per 1000 cubic feet, without meter-rents. The usual dividend of £2 10s. per £10 share was paid.

There was an occurrence in the Beith Gas-Works yesterday, which your readers may care to hear about. This arose from an explosion. New purifiers had been fitted up in a one-storey building next to the street; and the Manager and two tradesmen were testing the pipe connecting the purifiers with a gasholder on the other side of the street. One of the workmen applied a light to a joint, when, at once, there was an outburst of flame which filled the building. The three men got out as speedily as they could, but not before they had sustained some scorching. The building took fire and was demolished. The loss to the Company is little more than the roof and woodwork of the purifier-house, and is not serious, further than that it is undesirable to have a fire, either large or small, in a gas-works. Perhaps the narration of these facts may lead to greater care being exercised by others in the use of lights when engaged in the somewhat dangerous work of bringing new plant into use.

The Central Electric Lighting Station at Morecambe a Nuisance.—Four residents in the neighbourhood of the central station of the Morecambe Electric Light and Power Company, attended the meeting of the Local Board last Tuesday to complain of the noise arising from the machinery at the central station and the damage sustained by them in their business and to their property. The Company, it seemed, had repeatedly promised to stop the nuisance arising from the vibration of the engines; but it was now worse than ever before. On the previous Saturday, for instance, it was alleged that the machinery was "hammering away" until nearly twelve o'clock at night. Visitors staying in the neighbouring houses complained strongly of the annoyance; and a number had left on that account. One lady asserted that the vibration in her house was so strong as to stop the clock, and another that, owing to excavations being made by the Company, her premises had been considerably damaged—cracks quite an inch wide having been caused in the back walls. The Chairman of the Board (Mr. H. Baxter) intimated that anything they could do in the matter, as the local authority, should be done.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Sept.* 17.

Sulphate of Ammonia.—A strong demand prevails for parcels for immediate shipment; and for these £10 has been paid, both f.o.b. Hull and Liverpool. The urgency of requirements corroborates the statement previously made in these columns—that consumers are entirely without stocks, and simultaneously dealers find difficulty in securing sufficient sulphate to complete contracts previously entered into. If it is also taken into consideration that stocks on this side have fallen to a minimum, and that the present demand is only kept in bounds by the continuance of the cholera epidemic abroad, it may not unreasonably be prognosticated that the market will continue to improve steadily for some time to come, and that the increased production will not have the deleterious effect speculators would have us believe. Nitrate is quite steady again; and any improvement in this commodity would speedily bring sulphate buyers to consider their position.

LONDON, *Sept.* 17.

Tar Products.—There is very little life in this market; and although pitch is fairly firm, and carbolic acid is moving more freely, other products are distinctly dull and neglected. Benzol (90's), after touching 1s. 8½d., has receded to 1s. 7½d., at which price it is not easy to sell. The 50's are now more saleable than the 90's; 1s. 3½d. being offered for them. Distillers are wisely burning their surplus stocks of creosote oils and salts; and if this policy is pursued, that which is required will be sold at better prices. There is undoubtedly an overproduction; and it is well that producers are recognizing this. Sales during the week have been made at the following prices: Tar, 9s. to 10s. Pitch, 27s. Benzol, 90's, 1s. 7½d.; 50's, 1s. 3½d. Toluol, 1s. 1½d. Solvent naphtha, 1s. 1½d. Crude benzol naphtha, 30 per cent., 7d. Creosote, 1½d. Creosote salts, 20s. Pressed naphthalene, 40s. Carbolic acid, 60's, 1s. 9d.; 70's, 2s. Crystals, 6½d. Cresol, 1s. 10½d. Anthracene, 30 per cent., "A" quality, 9d.; "B," 6½d.

Sulphate of Ammonia.—Although buyers pretend to be indifferent, there is no getting over the fact that considerable shipments are going on; and that stocks are not increasing, notwithstanding that the make has increased considerably. The value of sulphate is now distinctly better; and transactions of considerable magnitude have been made during the week at prices ranging from £9 16s. 3d. to £10. Gas liquor (10-oz.) is valued at 5s. 9d. to 6s. 9d. per ton.

COAL TRADE REPORTS.

Northern Coal Trade.—The demand for coal, generally speaking, is slightly weaker; and in a few instances some of the northern collieries have had to accept rather lower prices, to keep pits fully at work. Best Northumbrian steam coal may be quoted generally at 10s. 6d. per ton f.o.b.; but a few pence less has been taken, and unless there should be a fuller order-book soon, the price may droop. Second-class coals are about 1s. per ton less; and small steam coals, being very abundant, have been sold at from 3s. 6d. to 4s. per ton, according to quality. Household coals are depressed; the consumption being very low. For bunker coals, there is a fair demand; but the supplies are very large, and the prices are weak in consequence—at from 7s. per ton for unscreened, up to 10s. per ton for best Durham screened. There is a fair inquiry for manufacturing coals; but forward orders can only be placed at prices rather less than those for the contracts now running. In the gas coal trade, a better demand is now generally noticeable; and this must weekly increase with the lengthening nights. There is an adequate supply, as the output of the chief pits is well maintained, and there are none of the sectional strikes that last year so materially kept back the production. The price asked for single cargoes varies from 8s. to 8s. 6d. per ton f.o.b.; but the contracts placed are known to be at prices that are at times considerably below this. Still, it seems to be believed that with the reduced cost of production, the present average prices will yield a fair profit to the owners of the chief gas coal collieries. Blast furnace coke is steady; and as more furnaces are to be blown in, there may be expected to be an enlarged output soon. Gas coke is quiet, with an increasing output, but with very limited stocks. There is no alteration in its price this week.

Lancashire Coal Trade.—The better classes of round coal are moving away more freely, and showing more firmness than when sellers were previously accepting under list rates. But there is no quotable change in prices—best Wigan Arley at the pit still not averaging more than 12s. to 12s. 6d.; Pemberton four-feet and second qualities of Arley, 10s. to 10s. 6d.; and common house coals, 8s. to 8s. 6d. per ton; whilst supplies remain in excess of requirements. Common round coals continue without improvement, and only in very indifferent demand either for steam or iron-making purposes. They do not average more than 7s. 6d. to 8s. per ton at the pit mouth; while for shipment, surplus supplies are offered very low. Delivered at the ports on the Mersey, ordinary steam coal can be bought at 8s. 6d. to 8s. 9d. per ton. Engine fuel is more plentiful and slightly easier; some sellers giving way 3d. per ton. At the pit mouth, burgy averages 6s. 3d. to 6s. 6d.; best slack, 5s. to 5s. 3d.; medium, 4s. 3d. to 4s. 6d.; and common, 3s. 3d. to 3s. 6d. per ton.

Scotch Coal Trade.—The outlook for the coalmasters is still darkening. There has been of late a great shrinkage in the foreign demand, consequent on the practical closing of the Hamburg entrance to the Continent, on account of cholera; but the home shrinkage, arising from dull trade and the stoppage of iron and steel production, is a worse feature of trade at this moment. Stocks are, despite the efforts of the miners, who are in many instances working only four days a week, rapidly accumulating. There is a belief among buyers that, compared with the prices ruling in the iron and steel trades, the price of coal is too high. The only difficulty in the adjustment of this is the wages paid to the miners. These do not seem to be in the best mood for fighting; and it is therefore probable that a reduction of wages, if proposed, would be accepted. Prices are this week down again. The quotations are: Main, 6s. 10d. to 7s.; ell, 8s.; splint, 7s. 6d. to 7s. 9d.; and steam, 9s. 6d. to 9s. 9d. per ton. Shipments are shrinking, though

they still keep in advance of those of last year. For the past week they amounted to 162,591 tons—a decrease of 3055 tons as compared with the preceding six days; but an increase of 6925 tons, compared with the corresponding week of last year. For the year to date, they amount to 5,210,132 tons—an increase over last year of 631,521 tons.

Ottoman Gas Company, Limited.—In the report to be submitted at the meeting of this Company to-day, the Directors state that the gas-rental for the past half year amounted to £8359, and the net profit to £2851. The sum standing to the credit of the profit and loss account is £3226, out of which a dividend is recommended at the rate of 7 per cent. per annum on both classes of shares. This will absorb £2625, leaving a balance to carry forward of £601.

The Price of Gas at Preston.—A deputation from the Amalgamated Friendly Societies of Preston waited upon the Mayor last Thursday with a view to urging him to call a public meeting to take into consideration the proposed increase in the price of gas. The Mayor undertook to communicate with the Gas Company, in order to see whether something could not be done to avert the threatened increase. If this fails, it is understood that a public meeting will then be called.

Morecambe Gas Company.—At the annual general meeting of this Company on the 31st ult., the report of the Directors, a notice of which has already appeared in the JOURNAL, was submitted. The Chairman (Mr. W. G. Welch), in moving its adoption, said there had been an increase during the twelve months of something like 50 per cent. in the consumption of gas, as compared with the year ending June 30, 1891. This showed the extent to which the consumers were making use of gas for cooking and heating purposes. Gas cooking-stoves were very largely employed at Morecambe; and the Directors hoped the number would be increased. An electric light station had been opened in the town; and he did not think the Company had any reason to regret it. There was plenty of scope in Morecambe for more light. They might possibly lose something in the older parts of the town; but with its extension in all directions, they would probably be more than compensated for any loss that might arise. During last year they spent £2700 on their works; and this had put them into a state of thorough efficiency. For this they felt that great credit was due to the Secretary and Manager (Mr. W. Duff). The report was adopted. A dividend of 5 per cent. for the past six months (making with the interim dividend 10 per cent. for the year) having been declared, the retiring Directors and Auditor were re-elected; and the proceedings closed with votes of thanks to the Directors, and to Mr. Duff, for their attention to the affairs of the Company.

Electric Lighting Scheme for Hanley.—The Hanley Town Council last Tuesday week had under consideration a report by the Electric Lighting Sub-Committee, in which it was recommended that a tender of the Brush Electrical Engineering Company, amounting to £15,760, be accepted; that application be made to the Local Government Board for sanction to borrow this amount, together with the sum of £5240 required for buildings, trenches, and other works, repayable in sixty years; and that an application be made to the Board of Trade for their approval of the system to be adopted. Alderman Hammersley entered into a detailed explanation of the scheme proposed to be adopted, and said that hitherto the British Gaslight Company had had the monopoly of artificial lighting, with the result that they took something like £10,000 a year out of the town, while neighbouring boroughs were possessed of their own gas undertaking, out of the profits of which they paid 6d. or 8d. in the pound towards the relief of the rates. The efforts which the Council had made to become possessors of the monopoly had proved unsuccessful; and therefore they had turned their attention to electric lighting, with the view of retaining, for the benefit of the borough, the large sums which had gone into the pockets of those who had no interest whatever in the place. The scheme now submitted had been adopted after careful consideration, and it was believed that the cost of the electric light would at the outset be about one-third more than gas; but as against that they would have many compensating advantages, including a more healthy illuminant. He proposed that the recommendations of the Committee be confirmed. This was seconded by Alderman Charlesworth, and carried unanimously.

Dover Gas Company.—The half-yearly report and accounts of this Company, which were noticed in the JOURNAL for the 23rd ult., were submitted to the shareholders by the Chairman (Mr. W. Mannering) at their meeting on the 5th inst. Having referred to the death of one of the Directors (Mr. H. Stone), and announced the appointment of Mr. A. Bottle to fill the vacancy, he remarked that the accounts disclosed the fact that they had again had a very successful half year. As compared with the corresponding period of 1891, the profit and loss account showed an increased revenue of £122, and a decreased expenditure of £218—the profit balance being more by £340, and after paying the dividend there would be a balance of £377 to carry forward. The figures also showed a saving in the charge for coals of £549, which had cost less by 1s. 7¾d. per ton. Against this, however, there was a falling off in the receipts for residuals of £210. Then, again, there was an increase of 2·15 per cent. in the sales of gas, supplementing the gas-rental by £305; and meter and stove rentals also gave £29 more. On the other hand, the charge for repairs and renewals had advanced by £263; and the minor charges were £68 more. It was gratifying to report that the Company sustained no material loss or inconvenience by the strike of the Durham miners. During the half year 7700 tons of coal were carbonized, or 76 tons more than in the corresponding period. From this they produced 88,197,000 cubic feet of gas, which was equal to 11,424 cubic feet per ton of coal carbonized. The quantity of gas accounted for was 80,940,400 feet; being equal to 10,512 cubic feet per ton of coal. These excellent results were obtained without the use of cannel coal, which was now very costly; and the Directors felt that great praise was due to their Resident Engineeer (Mr. R. Herring) for having devised a simple and inexpensive method of using oil as a substitute for cannel coal to enrich the gas, whereby a considerable saving was effected. The Chairman concluded by moving that the report be adopted, and a dividend be declared at the rate of 7½ per cent. per annum. Mr. E. Bottle seconded the motion, which was unanimously agreed to.

Neglecting to Comply with the Public Health (London) Act.—The East London Water-Works Company were summoned last Wednesday by the Vestry Clerk of Shoreditch for not complying with the requirements of the Public Health (London) Act of last year, by omitting to give notice in writing that a certain house within their limit of supply had ceased to be served with water by them. Mr. George Kebbell appeared for the Company; and Mr. Clarke, Assistant Vestry Clerk of St. Leonard, Shoreditch, supported the summons. The 49th section of the Act casts upon Water Companies the duty of giving to the sanitary authority of the parish in which a house from which the supply of water has been removed notice that the supply has been cut off, and such notice has to be given within 24 hours. The defendants supplied the premises, 135, Great Cambridge Street; and on Aug. 21, they cut off the water. The tenant did not state on what ground the Company took this action. The fact came to the knowledge of the Medical Officer of the parish (Mr. F. J. Allan); and he wrote to the Company, requesting to know why notice had not been sent him, as the sanitary authority. Late on the 25th, he received a notice, which was dated the 23rd. The envelope was put in to show that the post-mark was the 25th; and the Medical Officer said he was certain it was not delivered till the evening of the 25th. Even had he received it on the 23rd, it would still have been 24 hours late. Mr. Kebbell said he could not deny neglect to the latter extent; but it was the fault of a subordinate of the Company—a foreman—who, if any fine was imposed for such a trivial offence, trivial in point of time, would have to pay it. Mr. Kebbell pointed out further that the prosecution should in strictness have proved several other matters had the Company desired to fight the matter—among others that they, the Company, supplied the water for profit. The Magistrate (Mr. Dickinson) said that if the Company were not properly constituted, he (Mr. Kebbell) had no right to be heard. Mr. Kebbell said he would only plead on behalf of the man who had neglected to send the notice; and he called Alfred Emery, who said he forwarded the notice on the 23rd about midday, and had not, at that time, heard of a letter being received from the Medical Officer. He had forgotten the notice on the 22nd, being called away, after he had started to write it, on other work. Mr. Dickinson said he thought at the present time the giving of these notices was of the utmost importance on sanitary grounds; and he should fine the Company 40s.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 504.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d
590,000	10	13 Apr.	10½	Alliance & Dublin 10 p. c.	10	16—17	..	6 3 6
100,000	10	,,	7½	Do. 7 p. c	10	11—12	..	6 5 0
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	103—105	..	4 15 3
100,000	20	27 May	8	Bahia, Limited	20	10—12	..	13 6 8
200,000	5	12 May	7½	Bombay, Limited	5	6—6½	..	5 15 9
40,000	5	,,	7½	Do. New	4	4—4½	..	6 13 4
380,000	Stck.	12 Aug.	12½	Brentford Consolidated	100	212—217	..	5 10 7
150,000	,,	,,	9½	Do. New	100	163—168	..	5 10 1
220,000	20	15 Sept.	11½	Brighton & Hove Original	20	40—42*	..	5 9 6
888,500	Stck.	31 Aug.	5	Bristol.	100	95—100	..	5 0 0
320,000	20	13 Apr.	11½	British.	20	42—44	..	5 2 3
50,000	10	31 Aug.	11½	Bromley, Ordinary 10 p. c.	10	19—20	..	5 15 0
51,510	10	,,	8½	Do. 7 p. c.	10	14—16	..	5 6 3
328,750	10	—	—	Buenos Ayres (New) Limited	10	0—7	−½	—
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	92—95	..	6 6 4
150,000	20	12 Aug.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	13 Apr.	13	Commercial, Old Stock	100	235—240	..	5 8 4
165,000	,,	,,	10	Do. New do.	100	182—187	..	5 6 11
160,762	,,	15 June	4½	Do. 4½ p. c. Deb. do.	100	123—128	..	3 10 4
800,000	Stck.	15 June	10	Continental Union, Limited	100	222—227	..	4 8 1
200 000	,,	,,	7	Do. 7 p. c. Pref	100	185—195	..	5 2 7
75,000	Stck.	15 Sept.	10	Crystal Palace District	100	180-185*	..	5 8 1
486,090	10	28 July	10	European, Limited	10	19½—20½	+½	4 17 7
354,060	10	,,	10	Do. Partly paid	7½	14—15	..	5 0 0
5,470,820	Stck.	12 Aug.	12	Gaslight & Coke, A, Ordinary	100	216—221	..	5 9 1
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	96—98	..	4 1 7
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	252—257	..	3 18 0
30,000	,,	,,	5	Do. F, 5 p. c. Prt.	100	116—121	..	4 2 7
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	166—171	..	4 7 8
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	160—165	+4½	4 4 9
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	252—257	+2	3 18 0
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	150—154	..	3 17 11
1,061,150	,,	15 June	4	Do. 4 p. c. Deb. Stk.	100	116—118	+1	3 7 10
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	120—124	+1	3 12 7
908,000	,,	,,	6	Do. 6 p. c. do	100	164—169	..	3 11 0
3,800,000	Stck.	12 May	12	Imperial Continental	100	226—231	..	5 4 4
75,000	5	15 June	6	Malta & Mediterranean, Ltd.	5	3¾—4¼	−¼	7 1 8
568,000	100	1 Apr.	5	Met. of Melbourne, 5p. c. Deb.	100	108—110	..	4 10 11
541,920	20	15 June	5	Monte Video, Limited.	20	12—13	..	7 13 0
150,000	5	27 May	10	Oriental, Limited	5	8¼—8¾	..	5 14 3
60,000	5	30 Mar	7	Ottoman, Limited	5	4—5	..	7 0 0
166,870	10	—	2	Pará Limited	10	1½—2½	..	—
420,000	100	3 May	6	People's Gas of Chicago— 1st Mtg. Bds.	100	106—110	..	5 9 1
500,000	100	1 June	6	2nd Do.	100	100—103	..	5 16 7
150,000	10	—	10	San Paulo, Limited	10	7—8	−1	—
500,000	Stck.	31 Aug.	15½	South Metropolitan, A Stock	100	272—277	..	5 5 3
1,350,000	,,	,,	12	Do. B do.	100	225—230	..	5 4 4
230,000	,,	,,	13	Do. C do.	100	240—245	..	5 6 1
725,000	,,	14 July	5	Do. 5 p. c. Deb. Stk.	100	140—144	..	3 9 6
60,000	Stck.	31 Aug.	11½	Tottenham & Edm'nton, "A"	100	225—230	..	5 0 0
				WATER COMPANIES.				
743,952	Stck.	1 July	10	Chelsea, Ordinary	100	245—250	..	4 0 0
1,720,252	Stck.	13 Apr.	8	East London, Ordinary	100	196—201	..	3 19 7
544,440	,,	1 July	4½	Do. 4½ p. c. Deb. Stk.	100	140—144	..	3 2 6
700,000	50	1 July	8½	Grand Junction	50	99—103	..	3 17 8
708,000	Stck.	12 Aug.	11	Kent	100	260—265	..	3 19 3
1,043,800	100	1 July	9½	Lambeth, 10 p. c. max.	100	215—220	−1	4 6 4
406,200	100	,,	7½	Do. 7½ p. c. max.	100	190—194	..	3 17 3
279,700	Stck.	30 Mar.	4	Do. 4 p. c. Deb. Stk.	100	123—128	−½	3 2 6
500,000	100	12 Aug.	12½	New River, New Shares	100	320—330	..	3 13 6
1,000,000	Stck.	28 July	4	Do. 4 p. c. Deb. Stk	100	126—129	..	3 2 0
902,300	Stck.	15 June	6½	S'thwk & V'xhall, 10 p. c. max.	100	144—149	..	4 7 3
126,500	100	,,	6½	Do. D 7½ p. c. do.	100	134—138	..	4 14 3
1,155,066	Stck.	15 June	10	West Middlesex.	100	236—241	..	4 5 0

*Ex div.

A New Pumping-Station for St. Helens.—With a view to the construction of a new pumping-station, the St. Helens Corporation have recently acquired a piece of land at Melling, underneath which the Water Engineer (Mr. D. M. F. Gaskin) expects to find a good supply of water.

Messrs. Richmond and Co., Limited, of Warrington, have had exhibitions of gas appliances at the Town Hall, Gateshead, and at Torquay during last week. They also intimate that they have received the highest award—a Diploma of Merit and gold medal—for their apparatus as shown at the International Exhibition, Douglas, Isle of Man.

Additional Borrowing Powers for the Neath Corporation Gas Department.—At a meeting of the Neath Town Council last Tuesday, the propriety of taking steps to obtain additional borrowing powers for gas-works purposes was considered; and, after a brief discussion, Mr. E. Davies moved that the Council apply to the Local Government Board for a Provisional Order to partially repeal, alter, and amend the Neath Corporation Gas Act, 1874, so as to confer upon them additional borrowing powers (not exceeding £20,000) for gas-works purposes. The motion was carried with only two dissentients.

Visit of the Salford Corporation Gas Committee to the Works of West's Gas Improvement Company.—On the 8th inst., a number of the members of the Gas Committee of the Salford Corporation, accompanied by their Engineer (Mr. S. Y. Shoubridge), paid a visit to the works of West's Gas Improvement Company, Limited, Manchester, to inspect the working of the retort charging and drawing machinery which the Company have ready for delivery to the new retort-house of the Belfast Corporation; and they were so well impressed with the working of the apparatus, that they have since placed an order with the Company for two chargers for their Regent Road gas-works. In addition, the Committee saw machinery in course of construction for the South Metropolitan Gas Company, the Birmingham and Halifax Corporations, the Sydney and Rushden Gas Companies, as well as a large quantity of hydraulic mains and other retort-bench ironwork for the Sydney, Rushden, and Mitcham Gas Companies. It may also be mentioned that the Company have obtained the contracts for the stage floor for the new retort-house at Belfast, and for a steel railway siding for the Bradford Road works of the Manchester Corporation.

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Telegrams: "GWYNNEGRAM LONDON." **GWYNNE & CO.,** TELEPHONE No. 2698.

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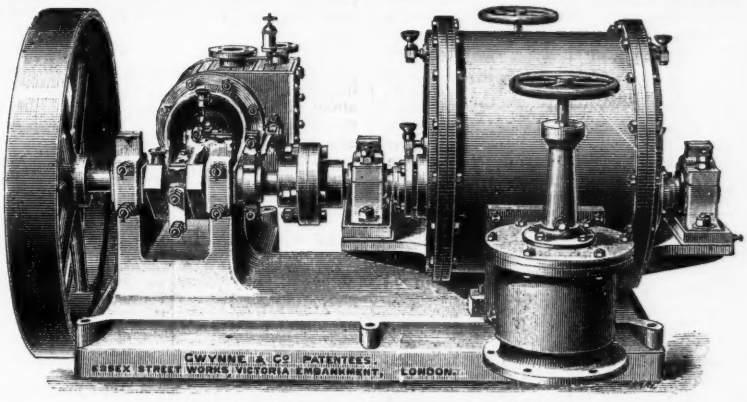
Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co., for Gas Exhausters, &c.

They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality.

The result is that in every instance their work is giving the fullest satisfaction.

They have completed Exhausters to the extent of 30,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work, and can be referred to.



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GWYNNE & Co.'s Exhausters are constructed of large size to pass the required quantity of Gas at very slow speeds; the wear and tear being reduced to a Minimum.

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Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

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Makers of GAS-VALVES HYDRAULIC REGULATORS VACUUM GOVERNORS STEAM-PUMPS for Tar, Liquor, or Water; PATENT SELF SEALING AND CLEANING RETORT-LIDS AND MOUTHPIECES; CENTRIFUGAL PUMPS and PUMPING ENGINES specially adapted for Water-Works raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

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Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

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*** See Advertisement p. III., centre of JOURNAL.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

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First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
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LIQUOR and Tar wanted.
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FRIEDRICH LUX, Ludwigshafen am Rhein; and at No. 142, Great Portland Street, London, W.
Lux's Gas Regulators for every consumption.
Lux's single-stem Pressure-Gauges.
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R. ANDREWS, Retort Setter. Thirty years' practical experience. Retorts set on the Regenerative Principle or Ordinary Settings; Benches built; Repairs, &c.
Address 67, Sugden Road, Lavender Hill, LONDON, S.W.

THE Manager of the Dorking Gas Company begs to inform Candidates that the POSITION OF FOREMAN at the Dorking Gas-Works is now filled up.

A GENTLEMAN, possessing considerable Commercial and Secretarial experience, seeks re-engagement as SECRETARY, MANAGER, or any position of trust. No objection to travelling. Highest references.
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WANTED, by a young Married Man (abstainer), a SITUATION as WORKING MANAGER of Gas-Works, making from 6 to 10 millions. Has held present Colonial Management over three years, in which he has had Engine, Exhauster, &c., under his charge. Could be disengaged in about Three Months.
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GOOD Mechanic and Fitter wanted for a Gas-Works. Must be used to Main and Service laying, Gas-Fitting, and the erection of Gas Plant.
Applications, with testimonials and wages required, to be addressed to No. 2142, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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FOR SALE—A perfectly new 20,000 cubic feet per hour EXHAUSTER, with Steam-Engine combined, including Hydraulic Gas Governor, Bye-Pass Valves, and Connections.
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FOR SALE—Wood-Grid Making Plant (suitable for general Woodwork), consisting of
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COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

TENDERS FOR SULPHURIC ACID.

THE Gas Committee invite Tenders for the supply of about 1100 tons of SULPHURIC ACID.
Forms of Tender may be had on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed tenders, endorsed "Tender for Acid," and addressed to the Chairman of the Gas Committee, to be delivered at the Town Clerk's Office, Town Hall, Salford, not later than Three p.m., on Thursday, the 29th inst.

By order,
SAML. BROWN,
Town Clerk.

Town Hall, Salford,
Sept. 17, 1892.

TO COAL OWNERS.

THE Directors of the Windsor Royal Gaslight Company invite TENDERS for the supply of either of the following descriptions of GAS COALS—namely, New Pelton, Pelaw Main, Ravensworth Pelaw, Holmside, Londonderry, or East Pontop.
Tenders for any other class of Coals will not be entertained.
Forms of Tender can be obtained on application to the undersigned.

JOHN HENRY STRANGE,
Secretary.

Gas Offices, Windsor, Berks.,
Sept. 13, 1892.

TO TAR DISTILLERS AND MANUFACTURING CHEMISTS.

THE Windsor Royal Gaslight Company are prepared to receive TENDERS for the purchase of their surplus COAL TAR and AMMONIACAL LIQUOR (10-oz. Liquor) for One year, from the 4th day of October, 1892.
The Tar will have to be removed in barrels; but the Liquor can be pumped into railway tanks on the Great Western Railway.
The Contractor must be prepared to keep the Company cleared of both Tar and Liquor, and to provide all the necessary barrels for the purpose.
The Directors do not bind themselves to accept the highest or any tender.
Any further information may be obtained on application to Mr. J. Wadeson, Manager.
Sealed tenders, stating price at the Company's Works free of all charges, must be sent in by Twelve o'clock at Noon on Tuesday, the 4th day of October, 1892.

By order,
JOHN HENRY STRANGE,
Secretary.

Gas Offices, Victoria Street, Windsor.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors, for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
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LUDLOW UNION GAS COMPANY.

THE Company are prepared to receive TENDERS for the supply, during the period from the 17th of September, 1892, to the 30th of June, 1893, of from 1200 to 1500 tons of best screened GAS COAL, in quantities to suit the requirements of the Company.
Tenders to be forwarded to J. W. MONTFORD, Solicitor, Ludlow, SALOP.

TENDERS FOR TAR.

THE Directors of the Ashford (Kent) Gas and Coke Company, Limited, invite TENDERS for their surplus TAR for One Year from the 1st of November next; the quantity being about 20,000 gallons.
Delivery will be into Trucks on Company's Siding, S.E.R., in Purchaser's Casks or Tanks.
Payment, cash monthly.
Tenders, endorsed "Tar," will be received by the undersigned until Saturday, Oct. 1, 1892.

F. HUGHES-HALLETT,
Secretary.

Ashford, Sept. 7, 1892.

TO TAR DISTILLERS AND OTHERS.

THE Rastrick Gas Company invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR produced at their Works during the ensuing Twelve Months, from the 1st of October next.
Tenders, stating price per ton, endorsed "Tender for Tar and Liquor," to be sent in not later than Friday, Sept. 30.
The Directors do not bind themselves to accept the highest or any tender.

ALFRED WEST,
Manager.

Gas-Works, Rastrick,
Sept. 10, 1892.

BOROUGH OF CARNARVON.

TENDERS FOR TAR.

THE Carnarvon Corporation Gas Com- mittee invite TENDERS for the purchase of the surplus TAR to be produced at their Gas-Works, during the Twelve months ending Oct. 31, 1893, amounting to about 110 tons, delivered in Contractor's Tanks at the Carnarvon Railway Station.
Payments, cash monthly.
Any further information may be obtained from the undersigned.
The Corporation do not bind themselves to accept the highest or any tender.
Tenders to be addressed to the Chairman of the Gas Committee, endorsed "Tar," and sent in on or before Friday, Sept. 23 next.

R. O. WYNNE ROBERTS,
Borough Engineer.

Corporation Office, Carnarvon,
Sept. 14, 1892.

TENDERS FOR TAR.

THE Derby Gaslight and Coke Company are prepared to receive TENDERS for the purchase of the surplus TAR they will have for disposal during the Twelve Months ending Sept. 20, 1893—namely, about 1800 tons, to be divided into Three Contracts of 600 tons each.
The Company will probably dispose of the total surplus of approximately 1800 tons, in One, Two, or Three Contracts as the Board may decide; but they do not bind themselves to accept the highest or other tender or tenders.
Tenders must be addressed to the Chairman of the Finance Committee of the Derby Gaslight and Coke Company, Friar Gate, Derby, endorsed "Tender for Tar," and delivered on or before Tuesday, the 27th day of September, 1892.
Further particulars may be had on application.

By order of the Directors,
RICHARD FISHER,
Secretary.

Derby Gas Office,
Sept. 6, 1892.

CONTRACT FOR GAS COALS.

THE Improvement Commissioners for the District of Milton-next-Sittingbourne invite TENDERS for the supply and delivery, during the year ending Oct. 16, 1893, of 800 tons of GAS COALS, which must be supplied at such times and in such quantities as the Manager of the Gas-Works shall direct.
Full Information with Form of Tender can be obtained on application to Mr. T. Pike, Gas-Works, Milton-next-Sittingbourne.
Sealed tenders, which must be on the form supplied, should be addressed to the Chairman of the Milton-next-Sittingbourne Improvement Commissioners, and endorsed "Tender for Gas Coals."
The tenders should be sent or delivered to me on or before Monday, Oct. 10 next.
The Commissioners do not bind themselves to accept the lowest or any tender.

By order,
WM. PARHAM,
Clerk.

Milton-next-Sittingbourne,
Sept. 16, 1892.

SWANSEA, GLAMORGANSHIRE.

IMPORTANT SALE OF SWANSEA GAS SHARES.

JOHN M. LEEDER AND SON will offer for Sale BY PUBLIC AUCTION (pursuant to the provisions of the Swansea Gas Order, 1888), at the Mackworth Arms Hotel, Wind Street, Swansea, on Friday, Oct. 7, 1892, 500 NEW ORDINARY 7 per cent. SHARES 1888, of £25 each, in the Swansea Gaslight Company, being part of the Additional Capital the Company is authorized to raise by the Swansea Gas Order, 1888.
The Shares will be entitled to Dividend at the rate not exceeding 7 per cent. per annum, and will rank equally in respect thereof as part of the Original Capital of the Company. All the Lots will be sold with the right to Dividend accruing as from the 1st day of October, 1892. The Company have for many years paid full Maximum Dividends; and they have a large Reserve Fund, which is available for maintaining such Dividends.
Sale to commence at Half-Past Two o'Clock in the Afternoon.
For further particulars and Conditions of Sale, apply to Mr. THORNTON ANDREWS, Secretary, Gas-Works, SWANSEA; or to the AUCTIONEERS, at their Offices, Goat Street, SWANSEA.

COMMERCIAL GAS COMPANY.

NOTICE is hereby given, that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on Friday, the 7th of October, 1892, at Twelve o'clock at noon,
To receive the Report of the Directors,
To declare a Dividend,
And for other Business.
The Stock Transfer Books will be closed from the 24th of September inst. to the 7th of October next, both days inclusive.

By order of the Board,
H. D. ELLIS,
Secretary.

Offices, Stepney,
Sept. 14, 1892.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is hereby given, that the Half- YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 28th inst., at Half-past Twelve o'clock precisely, to transact the usual Business, to declare a Dividend for the Half Year ended the 30th of June last, and to elect two Directors and one Auditor in the place of those who go out by rotation, but who are eligible to be re-elected.
Notice is hereby also given that the Transfer Books of the Company will be closed on the 17th and re-opened on the 29th inst.
By order of the Court of Directors,

FREDERIC LANE LINGING,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
Sept. 7, 1892.

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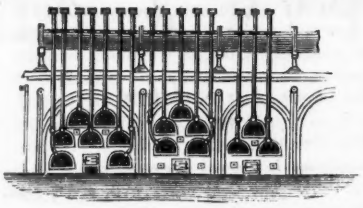

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Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,

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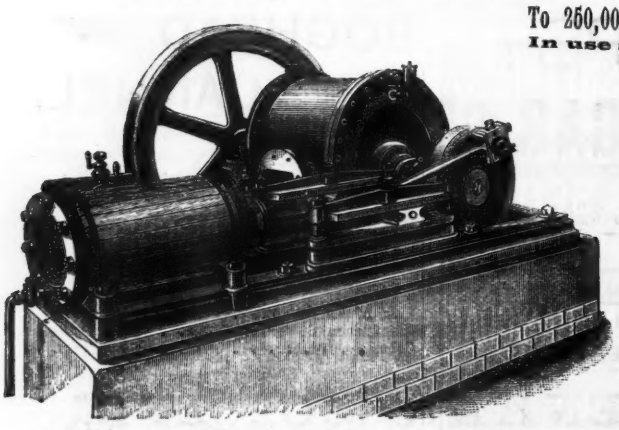

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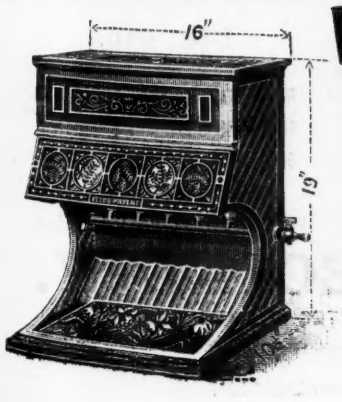

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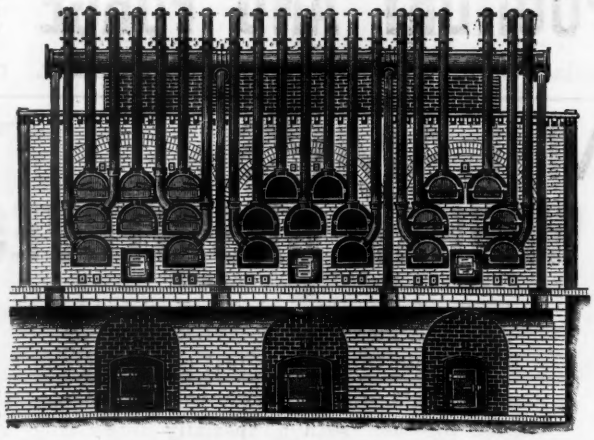

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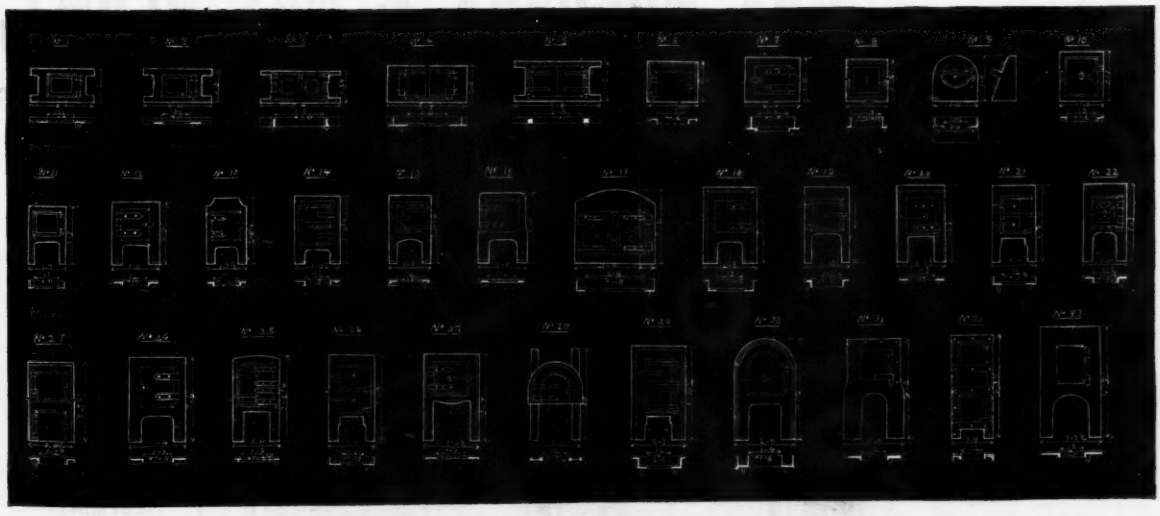

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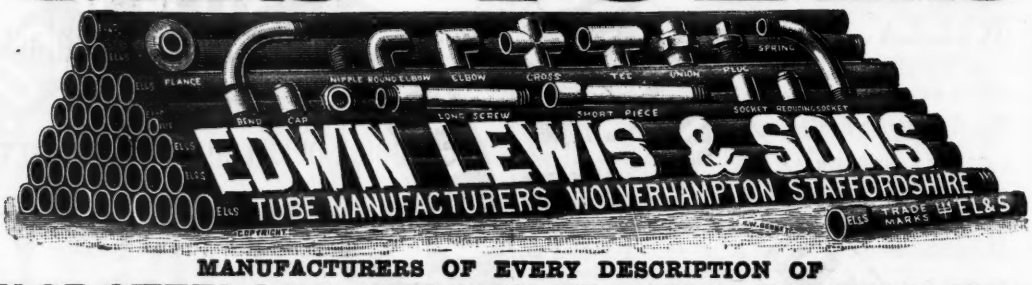

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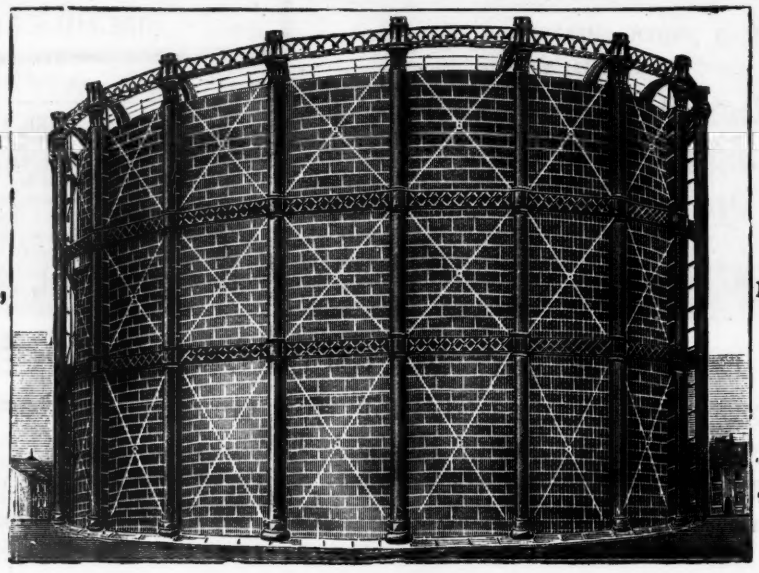

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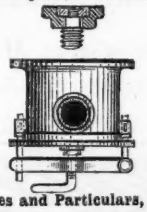

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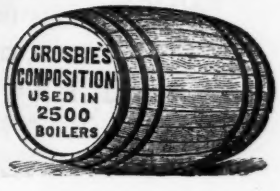

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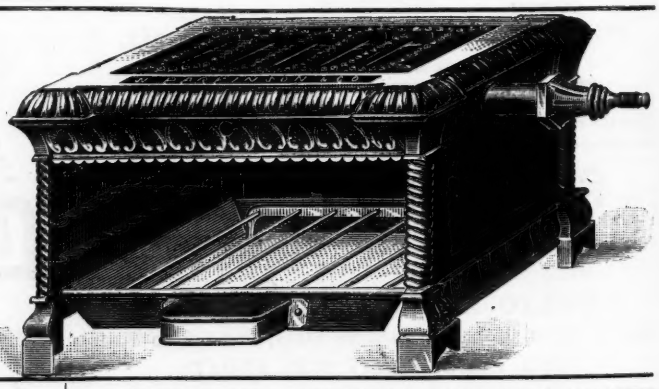

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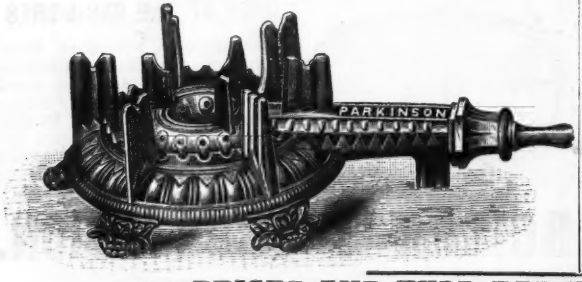

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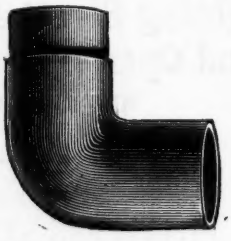

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[See also Advt. p. 500.

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